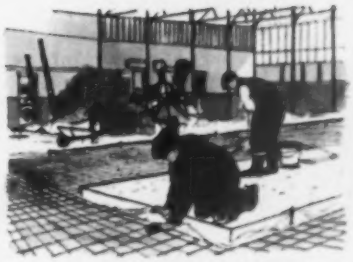
RUBBER and PLASTICS WEEKLY

Stack pipes, soil pipes, rain-water goods, made from 'Corvic' vinyl polymers

'Welvic' p.v.c. covered window frames

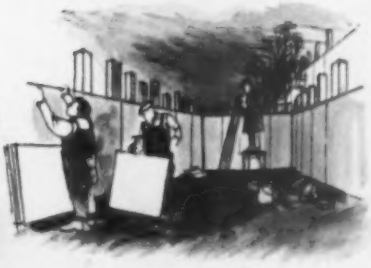


Polythene film damp and soil proof membranes under concrete

PLASTICS IN BUILDING new developments—new materials

Lighting fittings made from 'Perspex' and 'Diakon' acrylic materials

Baths, washbasins, sinks and drainers made from 'Perspex' acrylic sheet

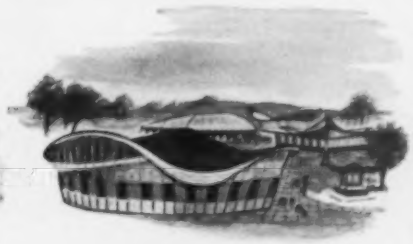


Concrete shuttering made from 'Flovic' vinyl copolymer foil

Visit the I.C.I. stand no. C66 Grand Hall, Interplas Exhibition, Olympia, June 21st–July 1st

Wall panelling made from 'Darvic' p.v.c. sheet

Water cisterns, ball floats and syphons made from 'Propathene' polypropylene



Stressed skin roofs—a future development in plastics

'Corvic', 'Welvic', 'Darvic', 'Diakon', 'Flovic', 'Perspex', 'Propathene', are regd. trade marks, the property of I.C.I. Be sure you obtain a copy of the I.C.I. book 'Plastics in Building'.

P836

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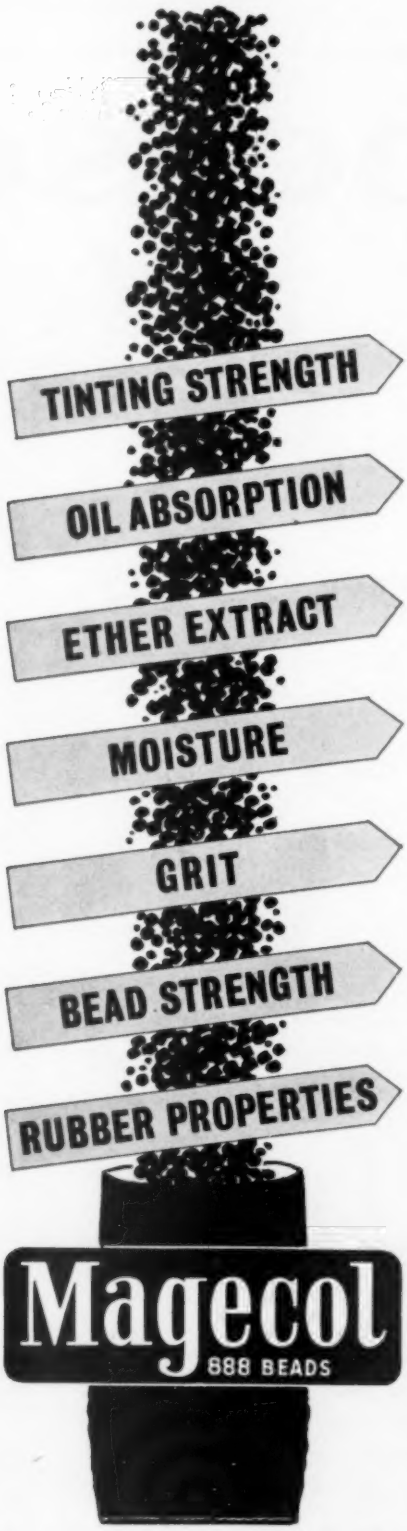

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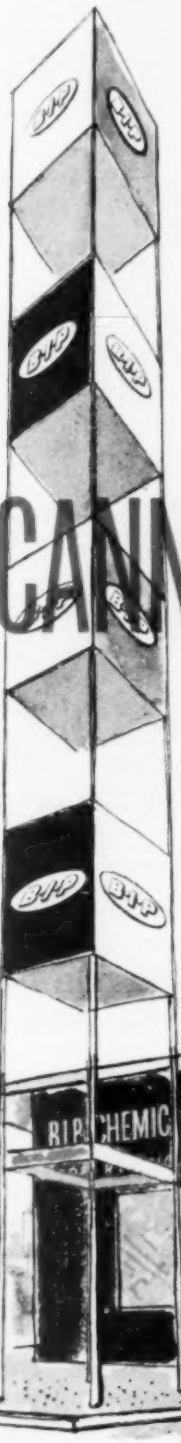

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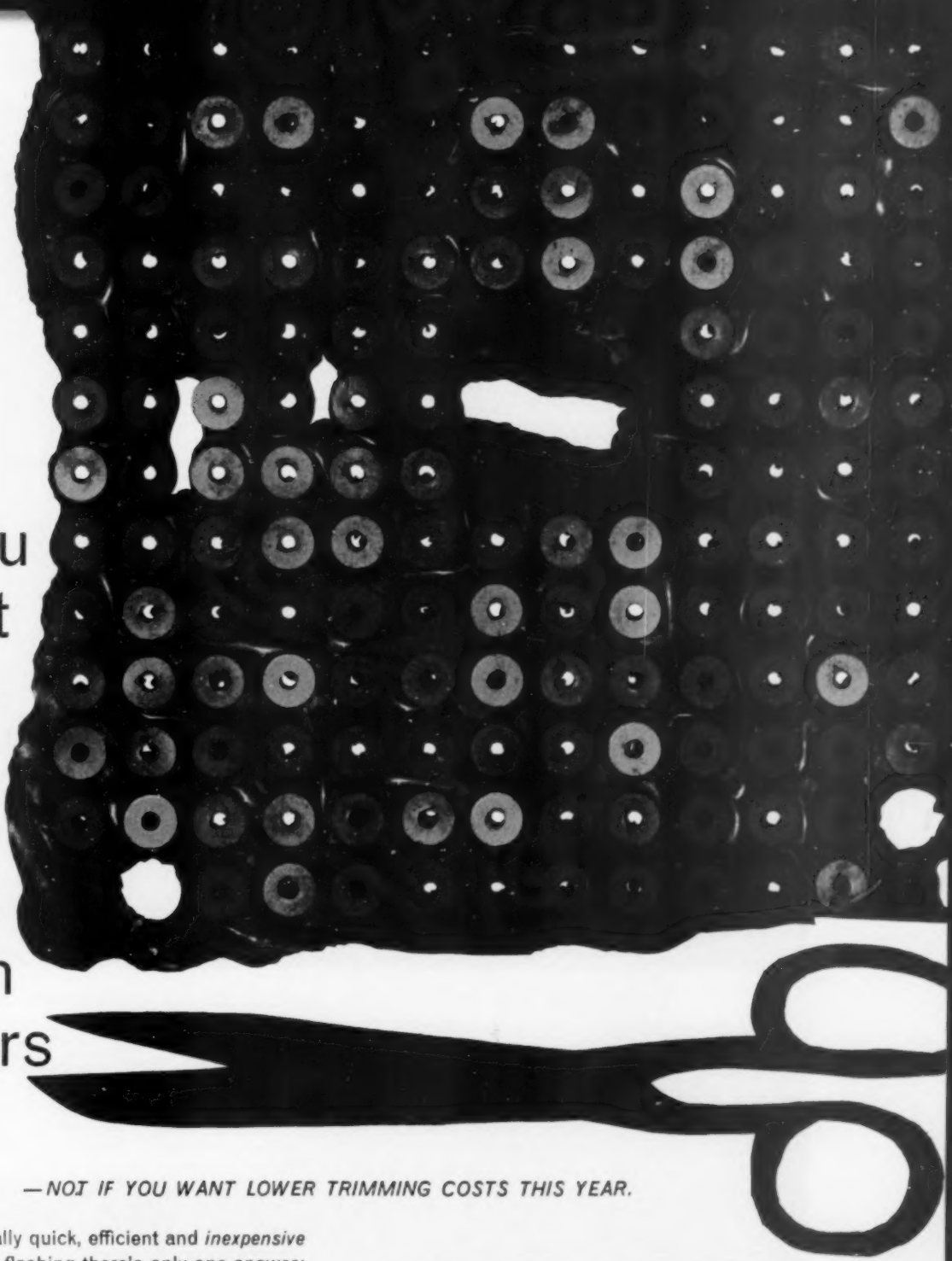

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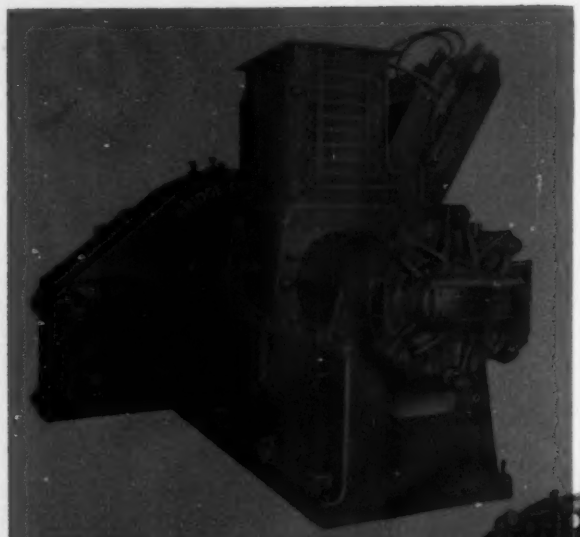

Plastics Extruder specially designed automatically to receive and extrude the batch from the Bridge Banbury Mixer. Operating under ideal fully controlled thermal conditions it continuously produces strip or roll forms from Banbury Mixer cycles as low as 2 minutes.

Size 11D High Horsepower Bridge - Banbury Mixer, equipped with roller bearings and the new patented hydraulically-operated drop door which facilitates rapid batch discharge and eliminates stock contamination.

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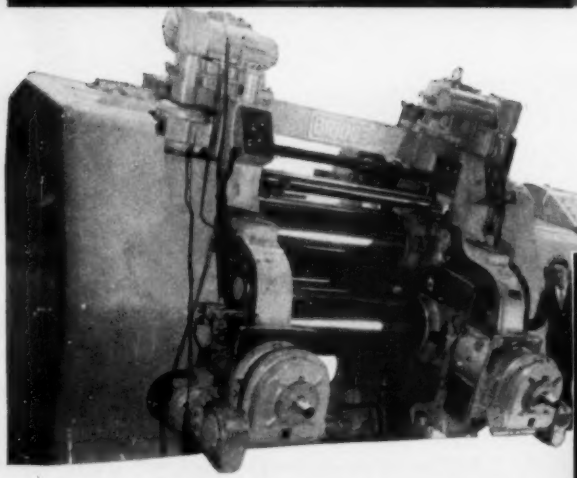
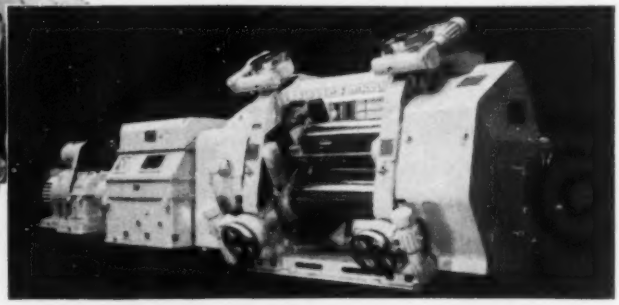


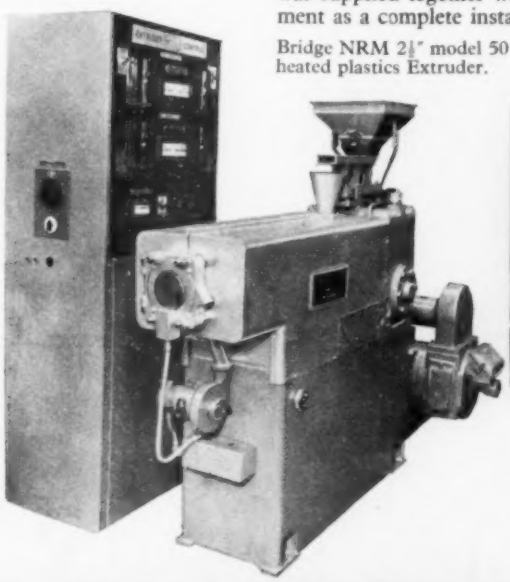
28″ x 74″ Inclined 'Z' Plastics Calender. Incorporates all the finest features of Plastics Calender design including hydraulic loading on the final nip.

Bridge-Farrel Calenders give tolerances of ±.0001″ on thin plastic films, at speeds up to 320ft. per minute.



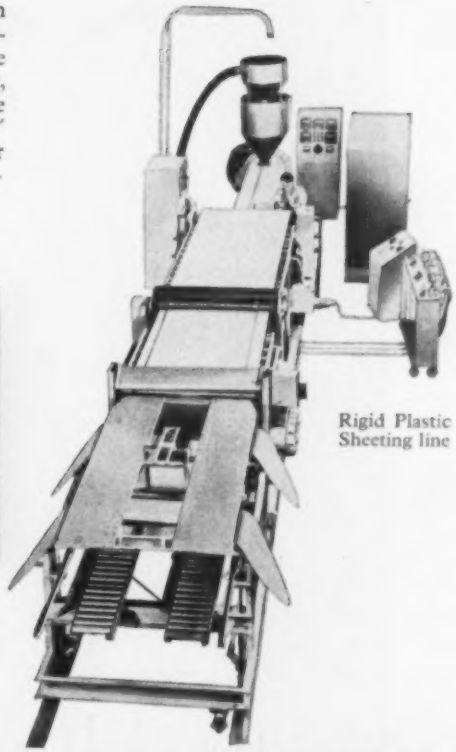
Bridge-Farrel 24″ x 66″ 3-Roll triangular Calender. The photo shows one of several recently built and in operation, considered to be the fastest precision Calenders in the world.

BRIDGE—NRM PACKAGED INSTALLATIONS Bridge design and produce complete installations for the production and processing of all types of plastics products. We illustrate a sheeting line for the production of rigid plastic sheet. From extruder to stacker, this is a completely self-contained unit which includes every piece of equipment required. The close-up illustration shows the 8″ diam. die for the production of blown film tubing. The extruder was supplied together with all ancillary equipment as a complete installation.



Bridge NRM 2½″ model 50 electrically heated plastics Extruder.

Bridge NRM Vertical Die for thin walled tubing.



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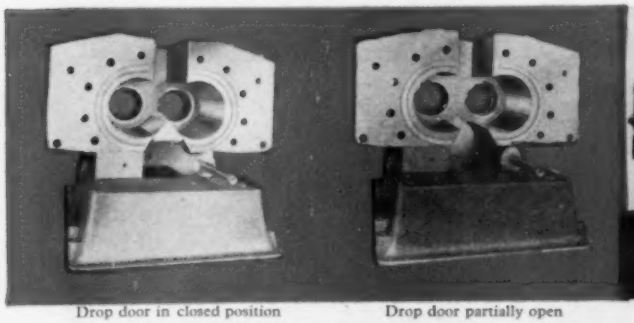
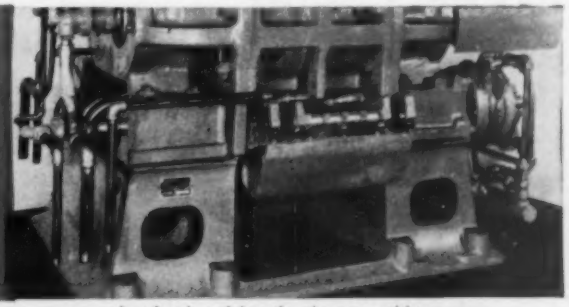


Drop door in closed position

Drop door partially open



Angular view of drop door in open position

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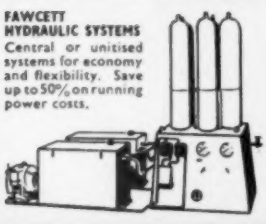

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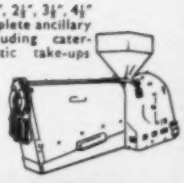

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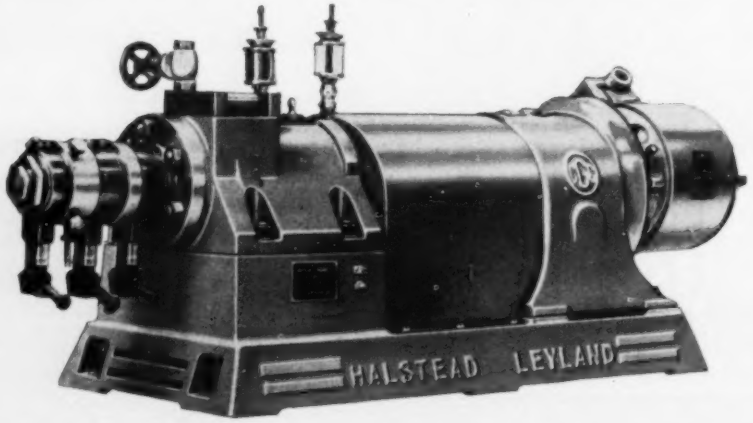

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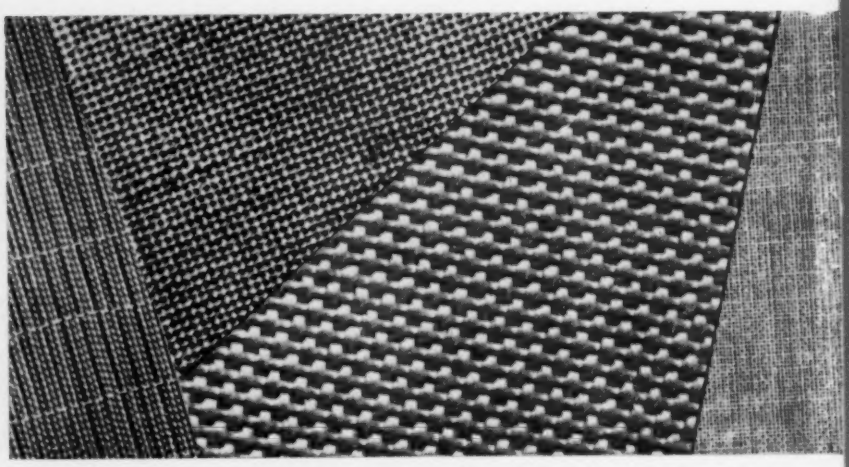

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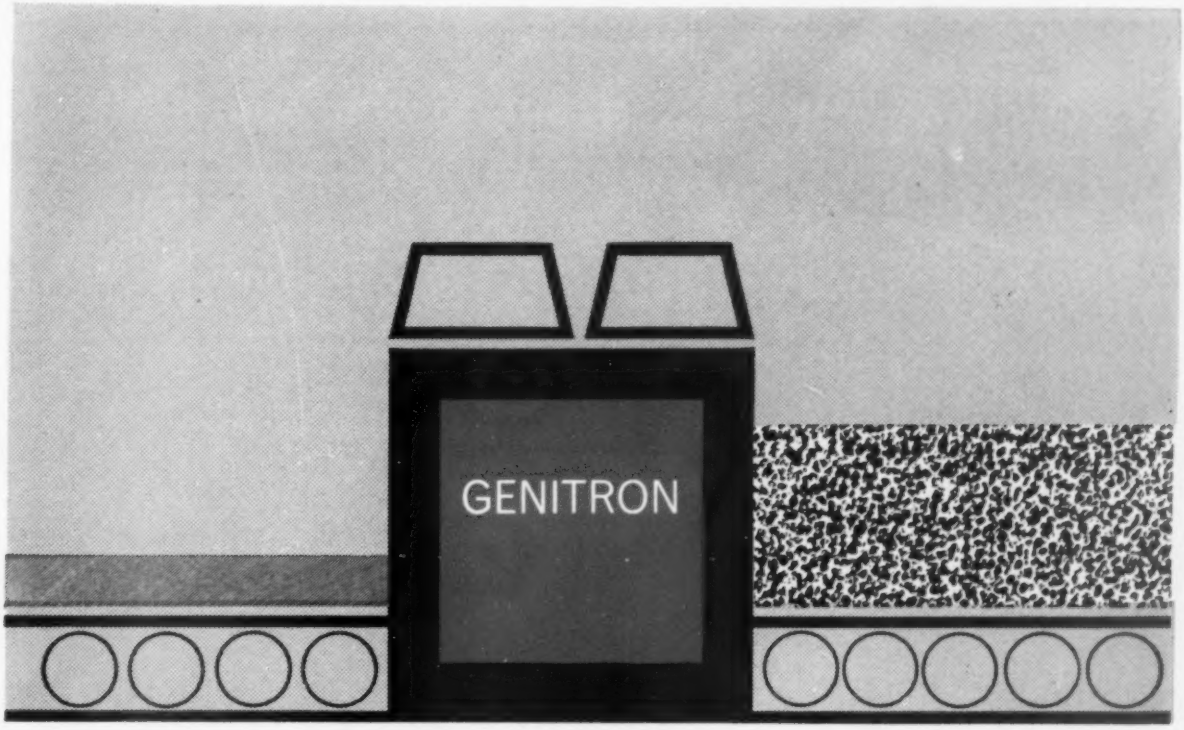

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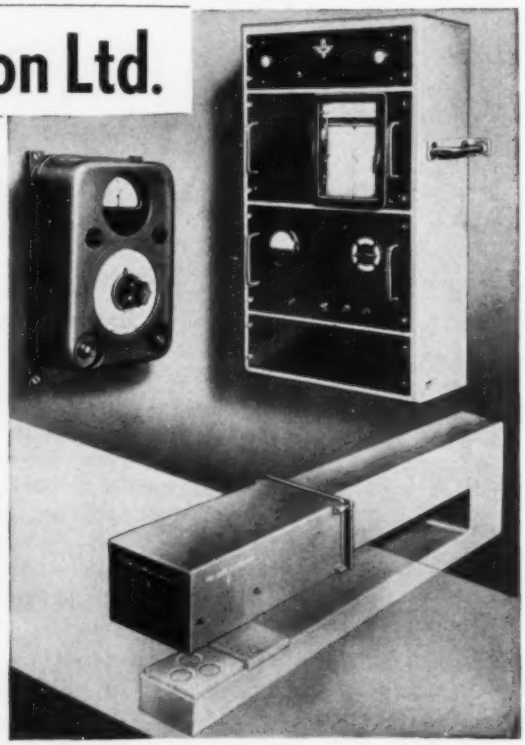

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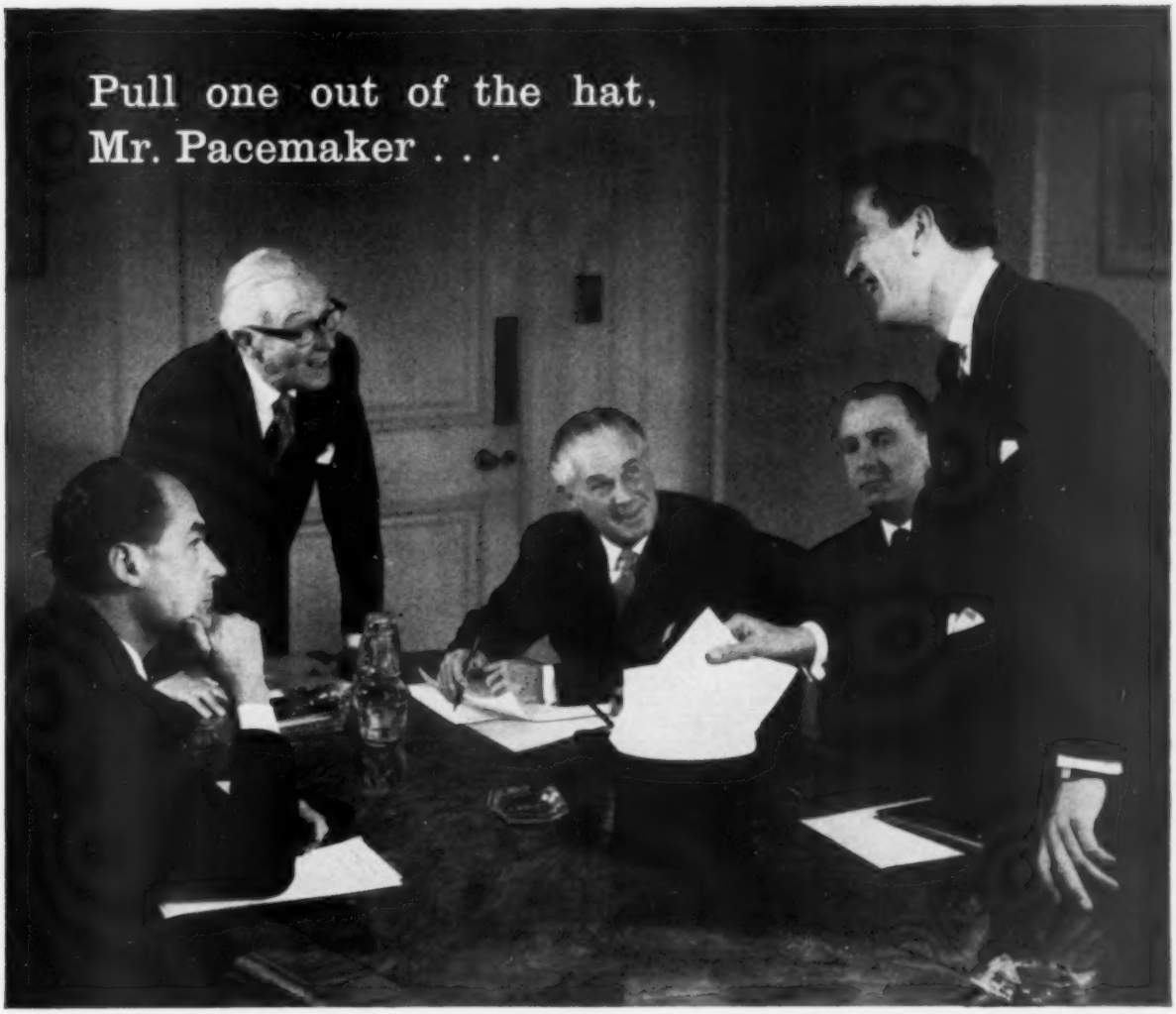

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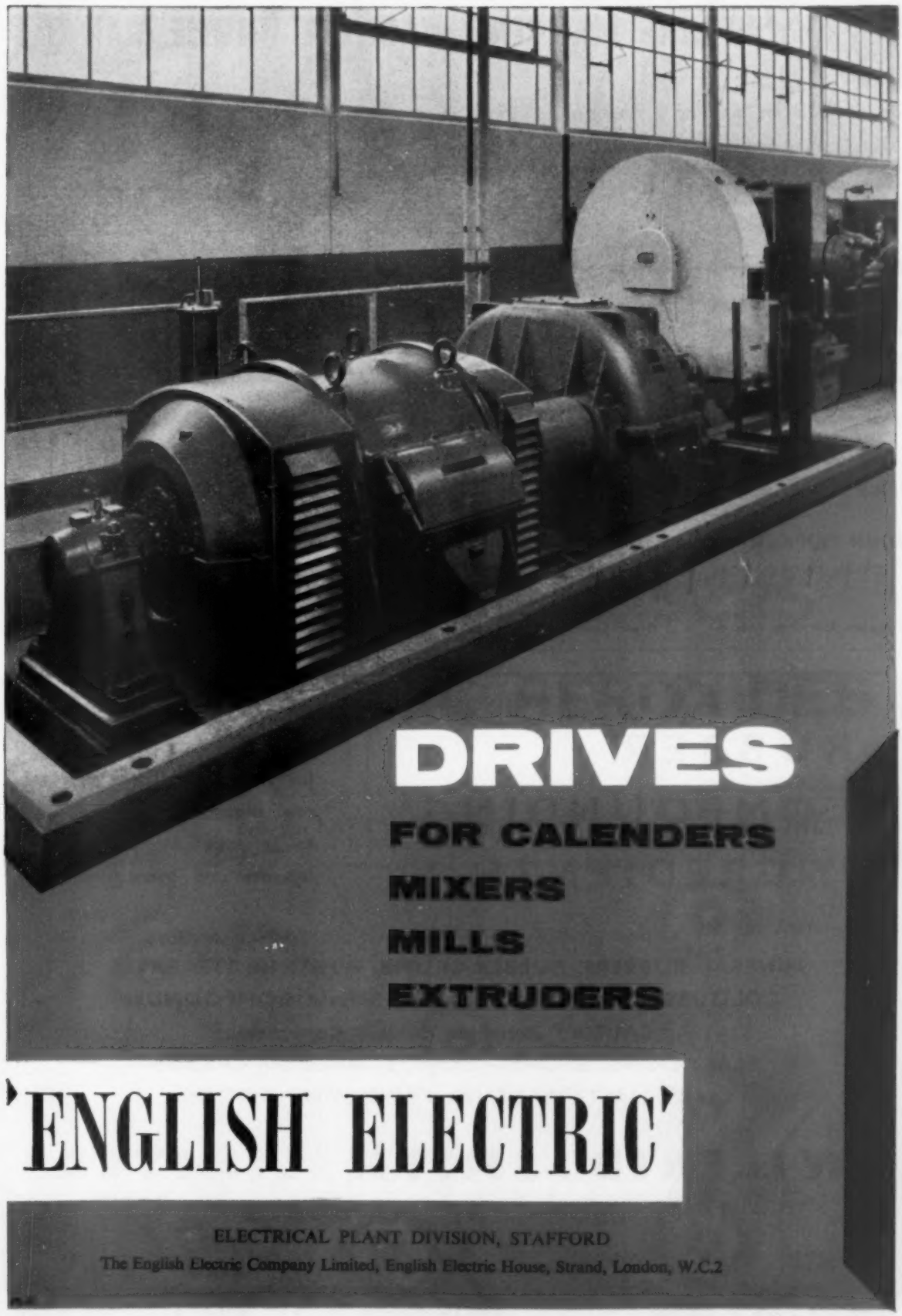
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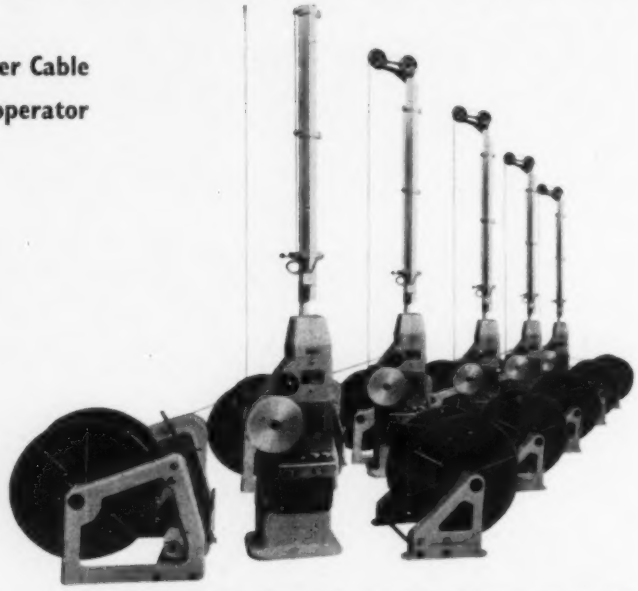

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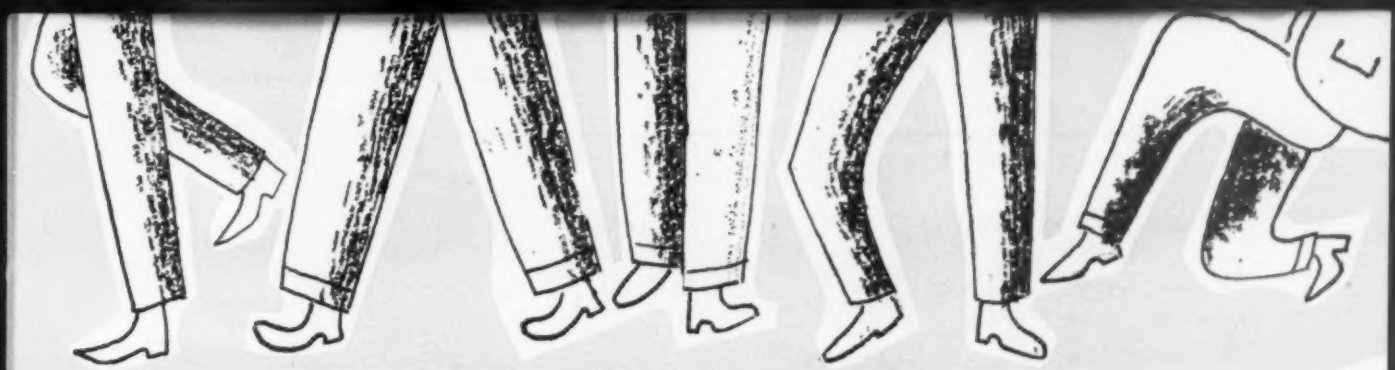

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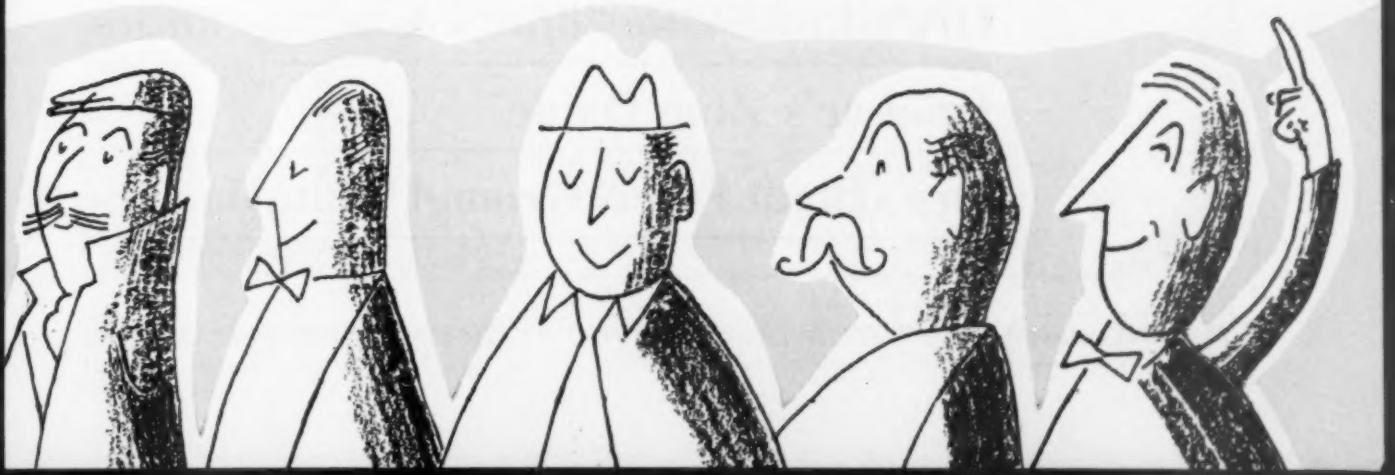

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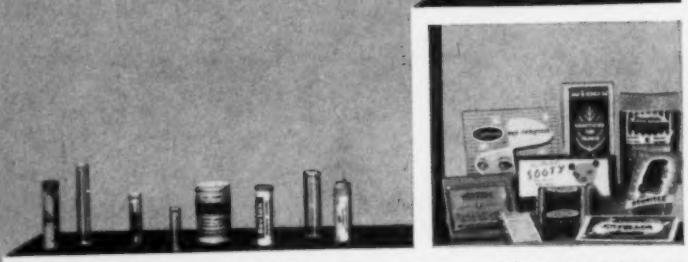

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RUBBER and PLASTICS WEEKLY

Formerly 'Rubber Journal and International Plastics'

Volume 140 *IN ITS 77th YEAR* **No. 24**

June 17 1961

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NOTES of the WEEK

Plastics World at Olympia

NEARLY 500 firms; 10,000 products; many thousands of overseas visitors from 26 countries ranging from Australia to Yugoslavia. These figures give some idea of the size of the Interplas international plastics exhibition, which opens at Olympia in four days' time (June 21). For ten days one of the largest collections of materials, machinery and products ever brought together will be displayed in London. With so much to see, in probably a limited period of time, the busy visitor might well wonder where to start; and it is with this thought in mind that this special issue of *RPW* has been prepared.

Excellent though exhibition catalogues are, they can only contain a certain amount of material. The guide published on page 927 has been classified by methods of fabrication, so that a visitor can see at a glance the stands that interest him, mark them off on a map of the exhibition, and plan his campaign accordingly. An injection moulder, for example, will find all the information he requires—exhibitors, stand numbers and a discussion on special points of interest—in a compact eight pages. Other sections cover blow moulding, coating and dipping, chemicals, compression moulding, extrusion, fabrication from sheet, foams and expanded materials, reinforced plastics, rotary casting, vacuum forming and ancillary services.

Preserving the Balance

ALTHOUGH a wide band of the polymer spectrum, so far as processing and some other topics are concerned, is common to both rubber and plastics, there are obviously parts that are definitely plastics and parts that are definitely rubber, however we may play about with our terminology. In a normal weekly issue we attempt to preserve a balance between these parts. There are times—such as this week, when the importance of Interplas calls for a special issue—when it is not possible to do this. (Even so, this is not taken too far—this issue, for example, contains a long article on the choice of electric drives for processing machinery, of equal interest to rubber and plastics technologists; and an article on reinforced plastics considers premixes using SB rubber.) Again, when the Institution of the Rubber Industry holds its fourth international rubber technology conference next May, the issue will be weighted towards the rubber side. We make this point so that readers may be assured that, overall, we aim to give the fullest possible coverage of both rubber and plastics—a task that becomes increasingly easier as the two fields move closer together.

Good Timing

IF, like the weather clerk, there is someone that might be called the 'economic conditions clerk', then he is plainly on the side of the Interplas exhibition. Last year plastic material sales, which started very well (first-quarter sales were 30% up on the same 1959 period) slackened off considerably. Production expanded faster than sales, and there was a consequent build up of stocks. Now, just before the exhibition is due to open, Board of Trade returns for the first quarter of this year show that the industry is picking up again. Net sales during the period rose to the encouraging level of 143,400 tons, an increase of 1,900 tons on the figure for the final quarter of 1960, and the steep rise in stocks has been checked.

A good deal of this improvement must be due to the recovery in the car and electrical industries, but some can be credited to plastics taking over applications from more traditional materials. The price cuts made over the last six months have plainly had an effect, particularly so far as polystyrene is concerned. Imports have been cut back by 13% in the first three months of this year, while exports—200,000 tons valued at £45m.—increased by 12%. A remarkable export increase of 100% has been recorded in the very competitive polystyrene field.

There are obviously still many problems: competition from cheap imports remains considerable; new outlets will become more difficult to develop. But—as Interplas will show—the UK plastics industry has the technical knowledge and the vigour to overcome them.

The INTERPLAS GUIDE starts on page 927

Readers are welcome to visit the Rubber and Plastics Weekly Stand—BB 537

NEWS *Briefs*

ROTTERDAM BUTADIENE STORAGE—BASF LOSES PATENT CASE—INDIAN RAYON LICENCE—NYLON KNOW-HOW FOR SPAIN — PVC FOR PHILIPPINES

●**Spain** — Algemene Kunstzijde Unie NV, of Arnhem, Netherlands, has signed a technical agreement in the polyamide field with the Madrid firm Perlofil SA. AKV has acquired 'a considerable holding in the Perlofil capital stock' and will give technical know-how and assistance to the Spanish company, which is one of three nylon producing companies in Spain. It produces nylon 6 at a plant near Madrid.

●**Russia** — The plastics laboratory of the USSR Academy of Architecture and Building Construction has produced an 'inflatable grain storage depot' made of proofed nylon fabric, similar to 'air houses' made in the UK. The spherical dome is supported by the slight excess of air pressure inside. The present type can take in 500 tons, but a new design for 3,000 tons is contemplated.

●**India** — The Government of India has granted licences to three firms for the manufacture of 17m. lb. of high tenacity rayon yarn a year in anticipation of a three-fold increase of tyre production by the end of the Third Plan. The three licensees are Century Rayons, Bombay (5m. lb.), National Rayon, Bombay (4m. lb.), and Delhi Cloth and General Mills, Delhi (8m. lb.). At present high tenacity rayon yarn is not produced in India. Present imports are estimated at 12m. lb. a year.

●**United States** — Rexall Chemical Co., a division of Rexall Drug and Chemical Co., will market a complete line of polypropylene resins from July 1. Rexall and El Paso Natural Gas Products Co. are currently building a 180m. lb. plant for the production of ethylene and propylene at Odessa, Texas. They also are building a 120m. lb. plant for low density polythenes to be completed in the first quarter of 1962. No announcements about the timing of their polypropylene and high density polythene plants have been made.

●**Holland** — NV Chemische Fabriek 'Naarden' of Holland and Kemi Oy of Finland have signed a preliminary agreement with Union Bag-Camp Paper Corp., USA, under which a jointly owned company will be set up to build a fractional distillation plant in Holland—the first such plant within the European Common Market. This company will fractionally distill tall oil, a by-product of the cellulose production process. Some of the products obtained are expected to be taken up by the rubber industry. The company, with a capital of $1.7m., will construct a plant at Wormerveer.

●**Kuwait** — A petrochemical industry is to be established in Kuwait under an agreement signed between the Italian concern Orenzio de Nora, the Kuwaiti National Petroleum Co. and National Industries Co. A company — Kuwaiti Petrochemicals — has been formed for the operation, which will involve an investment of around £16m.

●**Philippines** — A contract has been signed between the Mabuhay Rubber Co. and the Shinetsu Chemical Industry of Japan covering the use of the latter firm's process techniques for the production of pvc. The Philippine company expects to produce 500 tons of pvc a month.

●**Japan** — The shipbuilding firm of Hitachi is to extend its interests into the plastics machinery field. A technical agreement has been signed with the West German company Reifenhauser KG Maschinenfabrik for the manufacture of extruders and ancillary equipment.

●**United States** — Texas Butadiene and Chemical International Ltd. is to build a refrigerated terminal to receive ocean tanker deliveries of butadiene in northern Europe. The site for the new terminal has been tentatively set in the Rotterdam area. Ground is expected to be broken in July and plans are for the facility to be in operation in January 1962. Storage will consist of two insulated tanks of 2,000 tons capacity each, with the quality of butadiene protected by refrigeration. In commenting on the reasons leading to the decision to build this terminal, a TCBI spokesman said that studies of European SBR and polybutadiene plants now operating or under construction showed that most plants had inadequate storage capacity to enable them to continue operations in the event of accident or interruption in production of local butadiene plants.

●**Japan** — Sekisui Chemical Co. Ltd. has won a court decision over the West German firm Badische Anilin and Soda Fabrik AG over patent rights on the manufacturing and processing of foamed polystyrene. BASF is expected to appeal to a higher court.

'May we borrow your hydrogen atom before you butter it?'—541

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26 Countries at Interplas

THERMOPLASTICS THE THEME OF THREE DAY CONVENTION

BUSINESSMEN, scientists, technologists and students from the plastics industries of 26 countries will be arriving in London next week for the Interplas international plastics exhibition, which opens at Olympia on June 21 and runs until July 1. One party alone, organized by the Studien and Kongress-Reisen Gmbh of Germany, may include up to 1,000 members. Other very large groups are expected from Austria, Canada, Denmark, France, New Zealand, Norway, Sweden and USA.

Five hundred firms, spread over an area of 360,000 sq. ft., will take part in the exhibition, which is organized by *British Plastics* with the co-operation of the British Plastics Federation.

Three Day Convention

The international plastics convention, held in conjunction with Interplas, will cover three days (June 26-28) and will contain four sessions devoted to thermoplastics, and two sessions dealing with the processing of these materials.

In dealing with technical developments in olefin polymers, H. C. Raine (I.C.I.) will make the point that large numbers of higher α-olefins have been made and described, but most of them remain scientific curiosities: only poly(butene-1) has been produced commercially, and this shows some interesting behaviour. Mr Raine considers that, with more research, it is likely that other candidates will be chosen for further evaluation, and, if higher olefins — straight or branched — are commercially needed it is probable that economical routes will be devised. Other speakers on polyolefins will be Gerd H. Bausback (Farbwerke Hoechst AG) who will deal with the commercial aspects of high density polythene and polypropylene and W. A. Woodcock (Union Carbide International) who will do the same for low density polythene.

On the second day (June 27) of the convention J. J. P. Staudinger (Distillers Plastics Group) will consider vinyls from the technical point of view, and D. G. Owen and A. Renfrew (I.C.I.) from the commercial angle. Styrene based plastics will be covered by G. B. Thayer (Dow Chemical) and V. N. Luke (Shell Chemical).

Processing thermoplastics will be described on June 28 in four papers: single screw injection moulding, by Dr A. Kleine-Albers (Ankerwerk Gebr. Goller), bottle blowing techniques by J. F. E. Adams (Metal Box), extrusion equipment by Dr Gerhard Schenkel (Paul Troester) and film manufacturing techniques by D. Grant (Bone Bros.)

Exhibition Within an Exhibition

A prominent feature at Interplas will be an exhibition within an exhibition — the International Design Display (Stand C69), in which the world's foremost industrial designers will show their application of plastics in over 200 products for the home. The products in the display, in which 11 countries will participate, will be judged by a panel of international design authorities and awards presented.

Some two dozen products have been chosen from the Council of Industrial Design's Design Index to represent the UK. These include the Ultra TR70 portable transistor radio, for which its designer gained The Duke of Edinburgh's Prize for Elegant Design this year. There will also be five Design Centre Award winners — the Racasan 'Paragon' chemical closet, the Kodak 'Kodaslide 40' slide projector (both 1961), Brookes and Adams Ltd.'s 'Fiesta' melamine plates, the Kodak 'Brownie 44A' camera (both 1960), and Ward and Payne Ltd's 'Aristocrat' socket chisels with plastics handles (1959).

Guide to Interplas — page 927

Grange Phthalic Plant will be Built at Hull

GRANGE Chemicals Ltd.'s new plant for the manufacture of 15,000 tons a year of phthalic anhydride will be built at Hull. The contract for the plant has been placed with Badger Ltd.

It was announced in April (*RPW* April 8, 532) that the company was actively developing plans for the plant, which will use the orthoxylene route, and will be therefore the first in the UK to manufacture phthalic anhydride from a petroleum source.

The chemical has been produced by this route in USA for some time. The current UK method of production is via naphthalene, manufacturers including I.C.I. and Monsanto Chemicals.

A site for the new plant has been selected adjacent to the Salt End Chemical Works of The Distillers Co. Ltd., chemical division, which will operate the plant on behalf of Grange. It is expected to be commissioned during the second half of 1962, and will use feedstock from British Petroleum's new £7m. Kent refinery.

Grange Chemicals Ltd. is a subsidiary of British Hydrocarbon Chemicals Ltd., and a one-third interest is held by California Chemical Co. British Hydrocarbon Chemicals Ltd. is itself jointly owned by the British Petroleum Co. Ltd. and the Distillers Co. Ltd.

Phthalic anhydride is used to make phthalates, which are in growing demand, particularly as plasticizers for pvc and other resins. Other uses are for alkyd resins for paints and for polyester resins.

Underground Rubber

More new underground trains with rubber suspension units have been introduced by London Transport. They are running on the Metropolitan line services to Amersham, Chesham and Watford.

Rubber units in the bogies are used for both primary and secondary suspension, the axlebox springs being of the rubber-bonded chevron type housed in cast steel yokes provided with means for adjusting the frame height. Hydraulic dampers are fitted to control the vertical and lateral movement of the bolster.

All power cabling on the cars is in a composite natural/neoprene cable — which has a natural rubber dielectric with a neoprene sheath. This has displaced the previous standard cable having natural rubber insulation and flame-proof cotton braiding.

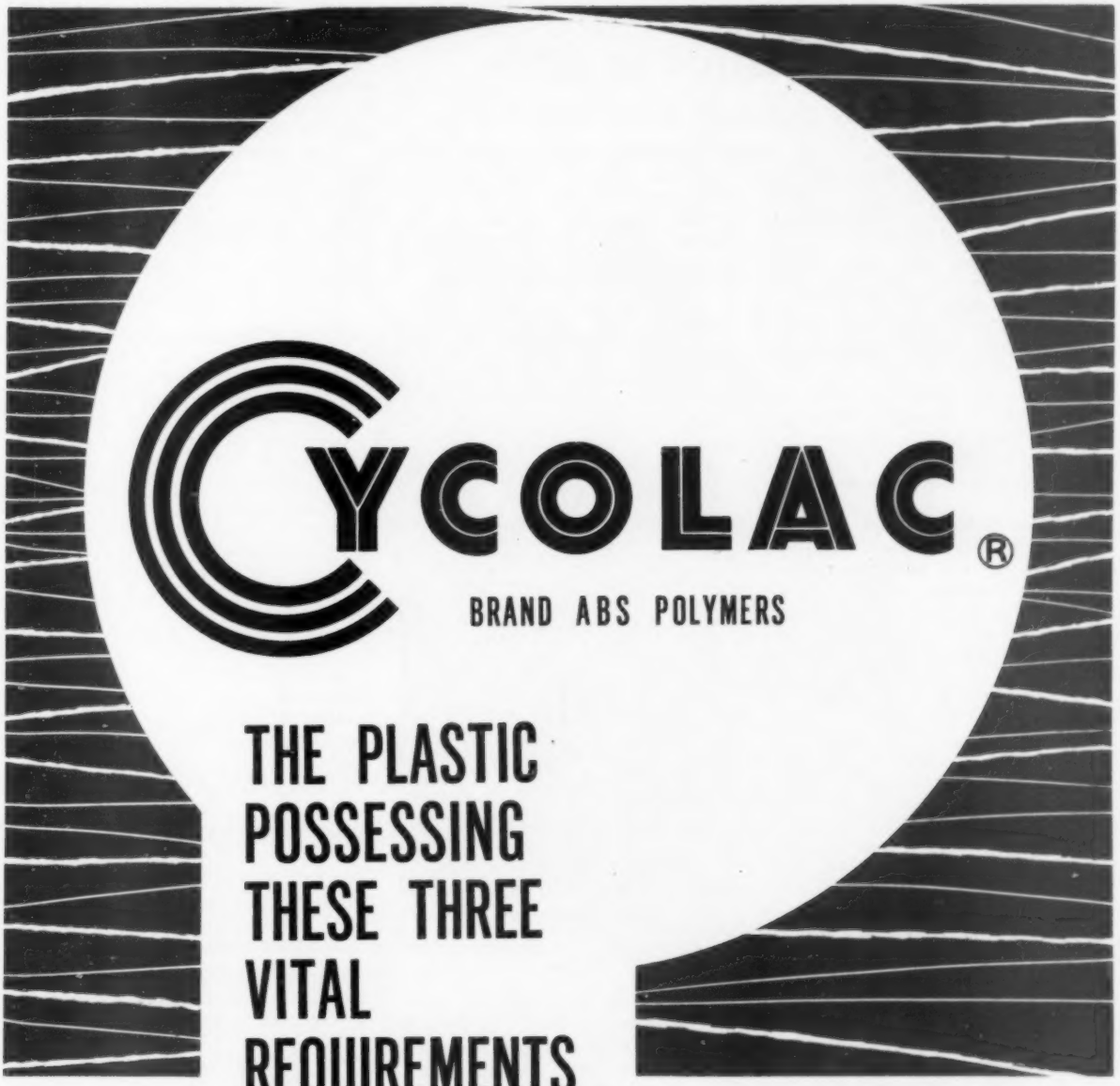
Dunlop Director Made a Baron

Sir Brian Robertson, who was appointed to the board of the Dunlop Rubber Co. Ltd. last week, is made a baron in the Queen's Birthday Honours List.

Among the new knights is Sydney Barratt, chairman of Albright and Wilson, Ltd., and a director of Joseph Lucas (Industries) Ltd.

George Angus and Co. Ltd. features in two awards: Lt.-Col. M. R. Chapman, a director of the company, receives a CBE, and W. D. Brown, export manager, an MBE.

A. W. Goode, formerly managing director Dunlop (Malayan) Estates Ltd., is awarded a CBE, and A. Katz, managing director of Mettoy, an OBE.



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Selling Plastics to USA

DURAPIPE FITTINGS CAMPAIGN OPENS IN NEW YORK

DURAPIPE and Fittings Ltd., a member of the Incledon and Lamberts group, is running a major sales campaign for its ABS moulded pipe fittings in the United States. The complete ranges, from ⅜in. to 6in. nb, were shown at the New York Plastics Exposition.

The company's chairman, Gerald Incledon, flew to New York for the Exposition and is spending three weeks meeting distributors and pipe manufacturers. Durapipe fittings are already being sold to plastics pipe manufacturers in the UK, Canada, South Africa, Scandinavia and India.

The Home of Plastics Pipe

Before leaving London Airport, Mr Incledon said: 'I believe this is the first time a British manufacturer of plastics pipe fittings has made a really determined effort to break into the American market, which is in many respects the home of plastics pipe. The potential in that country is enormous, since the American industrialist is already using a great deal more plastics pipe than his British counterpart. Although we expect to meet severe competition in the States, our experience in other countries shows that on quality and performance we have every reason to be confident of a good response'.

Durapipe, which has done pioneer work on ABS materials in the UK, is at present carrying out a series of development trials on the newer types of plastics for some of the largest American producers of raw plastics.

Although the fittings on display in New York were of the plain type for interference-fit solvent welding, Durapipe also makes a range of fittings with standard UK or US threads moulded in during production. The display featured the firm's reduction bushes which are used for making up unequal tees and elbows on site.

£225,000 Sheet Contract

Commercial Plastics Ltd. has been awarded a contract for sheeting for the Ministry of Works, worth nearly £225,000.

The sheeting has been specially developed to be used for lining excavated basins for water reservoirs, for emergency fire fighting purposes.

Filon at Ascot

The roof of Ascot's new Queen Elizabeth II stand has been lined with British Reinforced Plastics Ltd.'s Filon polyester/glass sheet.

Nearly an acre of the sheet, coloured green, has been used to give a non-corrosive finish to the 190yd. long stand, which accommodated 13,000 racegoers during Ascot Week.

PTFE Monofilament

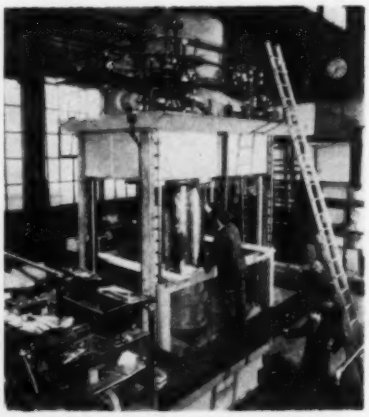
The latest achievement of the plastics division of Richard Klinger Ltd. is the production of ptfe monofilament in thicknesses down to 0.007in.

This material can be knitted to form a mesh and is expected to find many applications, including air filters, breathers, heat cushion pads, flexible leads and braided packings. The working temperature ranges from absolute zero to 300°C.

Osma Equipping for Expansion

OSMA PLASTICS LTD. is installing another Daniels 250-ton compression moulding press in its Hayes, Middlesex, factory.

This is the third 250-tonner to be brought into operation, and is a further step in the company's expansion programme. Seven Daniels compression moulding presses, of varying tonnages are already producing, apart from presses of other makes.



A 250-ton compression moulding machine nearing completion at Daniel's Stroud, Gloucestershire, factory

All the presses are fully employed in the mass-production of reinforced plastics products, and have been specially designed for this purpose.

The company adds that the new press, with its additional capacity, plus further presses which are on order from Daniels, will enable Osma Plastics to speed up the introduction of new items into its range of plastics building products. It will also provide the company's industrial division with greater flexibility in production.

US Stockpile Sales

Sales in May of crude natural rubber from the national stockpile totalled 2,153 long tons, the General Service Administration has announced. Delivery in that month amounted to 310 long tons.

Delivery of the remainder from Government warehouses is scheduled as follows: June 204 long tons, July 922 long tons and August 717 long tons.

Butakon Price Cut

Imperial Chemical Industries Ltd. has reduced the prices of its 'Butakon' S butadiene copolymer reinforcing resins.

S8551 is now quoted at 2s. 10d. a lb. and S7001 2s. 7½d. a lb. Both these prices apply for any quantity of the material.

Stace Develops Fabric Adhesive

A technique for coating fabrics with any kind of pressure-sensitive adhesive has been developed by Leonard Stace Ltd. of Cheltenham. The adhesive-coated cloth has a paper backing which strips off easily to leave the cloth ready for fixing simply by finger pressure.

The process can be applied to both synthetic and natural fibres, and is said not to affect the natural flexibility of the materials or to cause 'strike-through' — a common problem when conventional gluing methods are used on fabrics.

A pilot production plant is now in operation, following experimental work between the Cheltenham firm and a leading textile company. At the moment this has a capacity for producing up to 50,000yd. of coated cloth a week.

The firm says that among enquiries already received have been a number from manufacturers of linen-backed plastics.

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Electric Drives for Process Machinery

FIRMS DEVELOPING SPECIALIZED ATTITUDE FOR POLYMER PROCESSING

By RUDOLPH J. LANMAN,
Electrical Plant Division, English Electric Co. Ltd.

This article reviews the characteristics of electric motors and control equipment for rubber and plastic processing machinery, and is intended chiefly for the general plant engineer and the specialist machinery maker, who have to purchase electrical equipment frequently without specialist electrical knowledge. Rubber and thermoplastic processing employs similar machinery, both from the mechanical and electrical aspects, consequently electrical equipment for mixers, mills, calenders and extruders for rubber and plastics have common factors. The four common classes of drives are discussed, the mixers and mills that generally utilize the larger AC motors, and the calenders and extruders which more usually are powered by variable-speed DC motors

THE majority of production mixers are powered by AC motors, having either a fixed single speed, or two speeds at HP proportional to the speeds. Laboratory or research machines are frequently provided with variable speed drives to enable the most suitable power and speed for a particular type of stock to be ascertained. These are somewhat special, and it is, of course, the production mixer that sets the standard drive requirements.

A motor for any duty can be almost completely described by three salient features; power, torque and the type of enclosure, each being defined by the mixer drive. The power taken is not constant, but has regular cyclic variation as repeated batching takes place; the nature of the variation is seen in Fig. 1. The value of HP is dependent upon the size of mixer, speed and type of stock. To determine the continuous full load HP rating, it is necessary to ascertain the root mean square value of the load characteristic. Having done this, the ratio of RMS to peak is obtained, which fixes the peak torque rating of the motor. Due to the various duties a mixer may have to undertake, it is only possible to optimize in respect of power and torque, or to take laboratory results, or use results from similar mixers.

The common value of peak torque is about 250% of full load torque (which corresponds to the full load HP rating). Starting is performed with the mixer unloaded. The torque is only required to overcome machine friction, and to accelerate the relatively low inertia of the rotating parts. The occasions when a mixer has to start with stock in the chamber are very infrequent and various methods are available for the relief of load torque during starting.

The induction motor is the most suitable for a mixer and is the most common type of motor used. Synchronous motors are infrequently used, and then only to obtain an improvement in the system power factor. There are two classes of induction motor — the squirrel-cage motor and the wound rotor — the benefit obtained from the increased complication of the latter being its higher starting torque and lower switch-on current. The wound rotor motor has been mostly used in this country for mixers, due to supply authorities restrictions on the direct switching of squirrel-cage motors. The torque requirements can usually be provided by a squirrel-cage motor and, in the interests of reduction in capital cost of both motor and control equipment, they may be specified for operation from suitable supply systems. This type of motor is most commonly used in the USA for driving mixers.

The type of motor enclosure is determined by the local atmosphere. Carbon black and plasticizers affect insulation, the former, being conductive, can cause winding failures should even the smallest insulation flaw exist. Carbon black is also a nuisance in blocking motor ventilating ducts and generally contaminating all parts of the motor. Plasticizers, when present in certain quantities, can cause softening of certain types of insulation. For all these reasons, the totally enclosed motor is considered the only really satisfactory answer to the problem of contamination. In less contaminated locations it is satisfactory to use a naturally ventilated machine with the inlet air ducted from a clean supply. A view of a totally enclosed, water cooled motor is shown in Fig. 2.

The features of control equipment for mixers are simple. The motor is normally running continuously at a constant speed and requires the conventional measures of motor protection. Perhaps the most noteworthy in this respect is the motor thermal protection. For most steady load duties over-current protection is usually satisfactory, but for a fluctuating load it becomes more difficult to ensure proper protection by this means. Consequently back up protection is often provided by temperature detector thermo-couples, situated in direct contact with the motor windings and connected to a measuring and tripping instrument. The facility to inch-reverse the drive motor is desirable to relieve the load in the event of inadvertent stopping.

For both high and low voltages, contactor switching with short circuit protection by high-rupturing capacity (hrc) fuses is the customary present-day equipment.

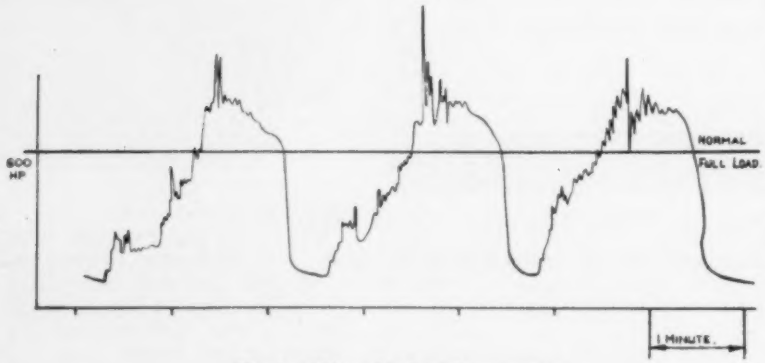

Fig. 1.—Mixer load cycle recording

Open Roll Mills

The mill, the most common item of machinery is, like the mixer, driven mostly by an AC induction motor and

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in a great many respects the motor requirements are similar, consequently it is convenient to discuss mainly the differences that occur.

The power requirements are dependent upon the length of roll, speed and type of stock. Up to about four mills may be driven from one motor and the greater the number, the less peaky is the load demand upon the motor. Even with only one mill, the peak torque demand is usually lower than for the mixer, but this factor varies considerably, and depends chiefly on the mill duty and the type of temperature of the stock processed. Sheeting and warming mills have fairly steady loads, crackers have peaky loads. Nevertheless, similar values of starting and pull out torque are specified, and the squirrel-cage motor is suitable for driving mills. The more even load also justifies the use of a synchronous motor for power factor improvement. The extent of contamination of the atmosphere will decide the form of the mill motor enclosure which can fall between the extremes of totally enclosed to naturally ventilated.

Because of the hazardous position in which the operator works, emergency stopping of the rolls is necessary and can be accomplished by either electrical or mechanical braking. Regulations by the NJIC specify a roll stopping distance of about one-eighth of a revolution.

Two popular electrical braking methods will be considered. Where an induction motor is used plugging is most common. Two of the three phases are switched over to create reverse torque to decelerate the motor. When near zero speed a centrifugal switch disconnects the supply, otherwise the motor would accelerate in the reverse direction. Braking torque for a synchronous motor is established by disconnecting the supply and re-connecting a resistor across the motor terminals, the field supply being maintained. This is called dynamic braking.

Both of these braking systems can usually be designed to comply with the stopping regulations and a typical stopping characteristic is shown in Fig. 3.

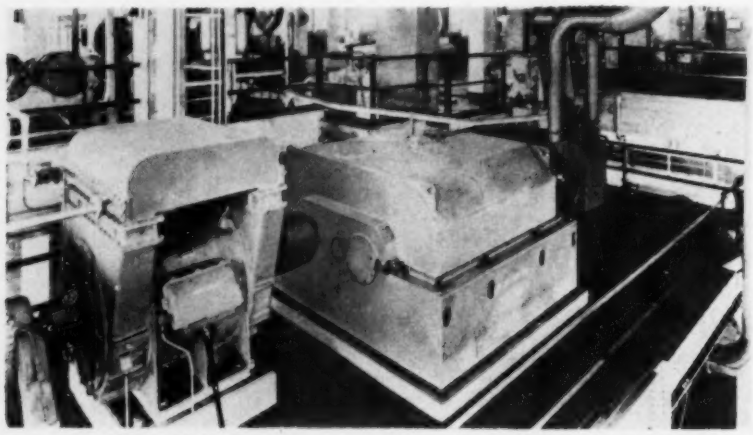

Fig. 2.—800hp, 3,300volts, 743rpm totally enclosed, closed air circuit, water cooled, type 'LDS' wound rotor induction motor driving an internal mixer

Synchronous motor excitation can be derived from a silicon rectifier, which can be accommodated in the control cubicle at a substantial saving in space and maintenance, compared with the separately driven rotating exciter. Such a rectifier system has been developed incorporating the special protection needed against induced field voltage should out-of-step conditions occur.

Calenders

Calender units take various forms ranging from a single calender with let-off and windup reels, to the multi-section unit, possibly combined with a nylon stretch unit. Almost all calenders require a variable speed drive for which the DC motor is unrivalled. The variable-voltage motor supply may be derived from a generator, rectifier or power magnetic amplifier. The former perhaps has most advantages, but all are equally suitable.

The individual duty of each section of the calender must be considered and its required features specified. For a rubber calender where tyre cord is being coated, a number of different functions are usually being performed that involve automatic control of speed and tension. The tension is important, being highest at the calendering section and decreasing towards the let-off and winder. A variation in tension setting of the calender section is usually required, and is most satisfactorily obtained by electrical means. Simple maintenance of a set tension between sections can be obtained by either dancer roll control, or by electrical means. Each calender must be examined individually and treated on its own merits. For simultaneous variation in speed of all sections, accompanied by the maintenance of constant tension during acceleration, a single common control device must be provided.

The DC shunt motor is versatile in speed, torque and power, and possesses good flexibility to meet a great many requirements, especially when the power source is obtained from an individual generator to comprise what is well known as the Ward-Leonard system. Fig. 4 shows a DC motor driving a tyre calender.

Speed is controlled either by armature voltage which provides HP variation proportional to the speed, the

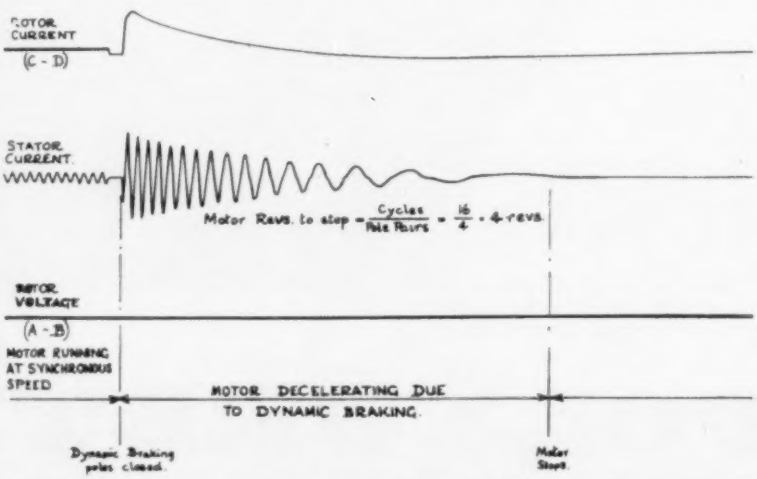
ROTOR CURRENT
(C - D)
STATOR CURRENT
Motor Revs. to stop = Cycles / Pole Pairs = 16/4 = 4 revs.
ROTOR VOLTAGE
(A - B)
MOTOR RUNNING AT SYNCHRONOUS SPEED
MOTOR DECELERATING DUE TO DYNAMIC BRAKING
Dynamic Braking poles closed.
Motor Stops.

Fig. 3.—Dynamic braking characteristics of 400hp, 3,300volts, 750rpm type GL salient pole synchronous motor driving a mill

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torque being constant, or by variation of the shunt field at constant HP, the torque decreasing as the speed increases.

The speed of a motor can fluctuate due to a number of reasons, the most significant being load torque variation. The motor speed regulation may be defined as the percentage decrease in speed from no load upon application of full rated load. It is important to note that irrespective of the set speed at which the motor is operating the regulation is always a constant rpm figure, thus if the speed regulation is expressed as 5% at maximum speed, the speed decrease upon application of full load torque when operating at half speed would be 10% at half speed.

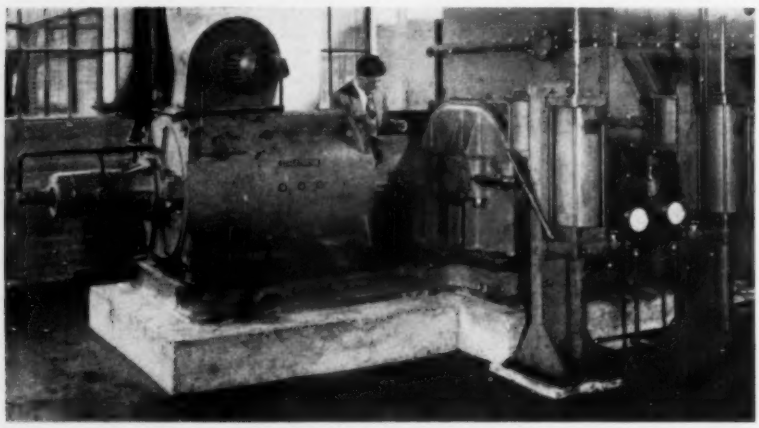

Fig. 4.—300hp, 500volts, 1,200rpm low inertia type 'CMR' dc motor driving one of the two three-roll calenders on a multi-motor type fabric calender train

Speed variations of this nature are undesirable for example in a calender forming part of a comprehensive processing line where stock bank variations can cause motor load torque variations. These changes are usually small but, together with other factors, automatic closed loop speed control is usually justified.

In this system compensation for speed changes is accomplished by making adjustments to the armature voltage, and an amplifier is necessary to provide the generator field power. The input to the amplifier is a low-power signal derived from speed sensing tachogenerator coupled to the motor shaft. Only a small speed decrease is necessary for full regulation compensation to be achieved, *e.g.* if the motor regulation was 5%, and the amplification factor 10, the actual speed decrease upon application of full load torque would be 0.5%. The corresponding rpm at maximum speed would be a constant value irrespective of the actual operating speed, similar to the uncontrolled system described previously.

An advantage of the amplifier is that fingertip control of large motors can be obtained. The speed setting signal with which the tachogenerator signal is compared, is also low powered and consequently small rheostats can be used for setting the desired speed, much smaller than those used to control the machine field directly.

Tension control most commonly takes one of the two following forms. A dancer roll tensioned pneumatically is interposed between two electric drives, and a rheostat or other electric roll position sensing device is used to control either one of the drives, to ensure maintenance of the tension which is proportional to the opposition of the pneumatic loading.

The other form of tension control is by all-electric means and has the advantage that variation of tension can be obtained by finger tip control. Pull rolls are used to create tension on, say, the outgoing side of a calender, where the tension between the calender and the pull rolls is required to be higher than that on the outgoing side of the pull rolls. A drive of this nature relies on the armature current as a measure of the tension, and a corresponding signal is used through an amplifier to control the machine field and ensure maintenance of the tension according to the reference setting.

It is important to note that the accuracy of this form of tension drive improves as the ratio of tension current to loss current increases. It is thus more suitable for calender drives that are processing high tensile type cord fabric. Where low tension is required to be controlled, dancer roll control is more accurate. The torque required to operate the electric tension sensing device must be small compared with the dancer roll loading.

Amplifiers are chiefly magnetic or electronic, the former probably being more reliable and robust. More recently, transistors are being proved for industrial use, and together with the silicon controlled rectifier, are likely to supersede other forms of amplifiers giving a substantial saving of space.

Other Drives

Besides calenders, extruders are the most significant users of variable speed drives. For the numerous other drives which may be considered as somewhat special, such as tyre machines, wire coating machines, fabric dipping units, etc., the general methods of speed and other forms of closed loop control are similar.

Compared with the calender, the extruder speed range is usually not as wide, and after the desired operating speed has been set all factors affecting speed stability are fairly constant. Measures to accurately control the speed are therefore not usually necessary.

A series of conveyors are associated with tyre extruders for cooling and handling of the extruded tread form, and proper speed matching between the extruder speed and the first conveyor, and between subsequent conveyors is essential. The reference for the first conveyor may be the signal from a tachogenerator on the extruder motor and matching between conveyors is commonly accomplished by low torque transducer operating the individual machine fields through amplifiers.

Conclusions

Electrical machinery manufacturers are becoming more familiar with the specialist problems met in the individual processing industries, but they can only hope to achieve the same understanding as their customers if a close liaison is maintained. If any processor has a power or control problem he is encouraged to place it before an electrical company specializing in the field. Only by mutual collaboration can the processing machinery user take full advantage of the versatility of electrical equipment, and only by mutual collaboration can the electrical manufacturers discover applications for their developing techniques.

Acknowledgments

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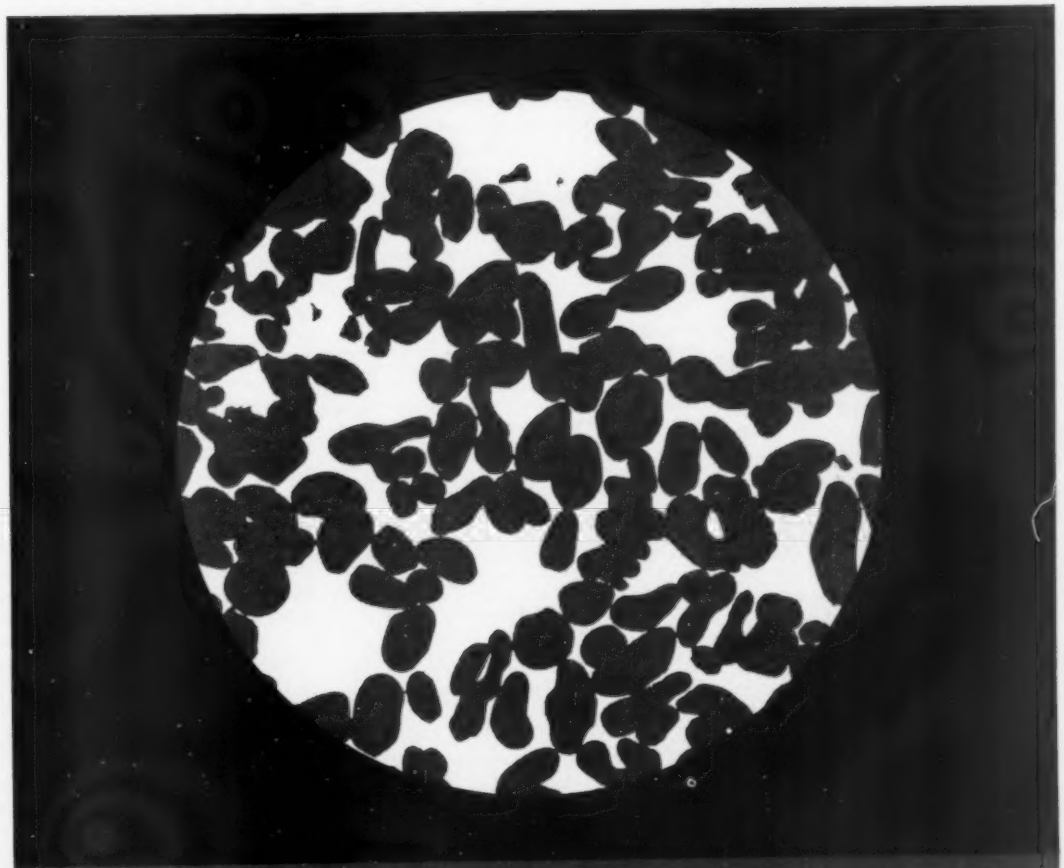

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GRP Premixes Based on Hydrocarbon Resins

OUTSTANDING RESISTANCE TO AQUEOUS MEDIA

By B. M. VANDERBILT and R. E. CLAYTON, Esso Research and Engineering Co., Chemicals Research Division, USA*

Premixes based on a liquid butadiene type polymer-vinyl toluene resin have good electrical properties and high resistance to aqueous liquids. Such a resin maintains a relatively high viscosity with increase in temperature thus making possible improved moulda-bility and uniformity. A finish can be applied to both the filler and reinforcement in the premix by means of a vinyl silane ester dissolved in the resin. This makes possible the use of low cost fillers of relatively large particle size to prepare highly loaded stocks of outstanding water resistance and good strength

HYDROCARBON resins consisting of blends of a liquid butadiene type polymer with a monomeric styrene are applicable in the preparation of reinforced plastics generally.[1] Due to the hydrocarbon nature of such resins, glass cloth laminates prepared therefrom have outstanding resistance to aqueous media.[2] Also as expected, castings and reinforced plastics prepared from such resins have low dielectric constants as well as good electrical properties generally.[3]

Due to the nonpolar nature of such resins, an effective chemical coupling agent on the glass surface is necessary in order to get good wetting and bonding of the resin to glass fibres. In fact, these hydrocarbon resins have proven to be a more sensitive tool for studying the bonding of glass to plastic than when using the more polar polyester and epoxy resins.[4] Work with resins of the hydrocarbon type has now been extended to premix compositions.

Ingredients Used in Premixes

Premixes studied were basically two types. One was the conventional type consisting of resin, chopped glass roving, and clay filler. The second contained resin and filler only.

1. Resin Compositions

The resin compound used in the major portion of the premixes studied was as follows:

	Part by Weight
Buton MD-360	96
Ethylene Dimethacrylate ..	4
Dicumyl Peroxide	2
Di-t-butyl Peroxide	2

Buton MD-360 is an all hydrocarbon resin marketed by the Enjay Chemical Co. consisting of:

60 parts polymeric resin
36 parts vinyl toluene
0.5 part A-172 Silane
0.25 part 2,6-di-t-butyl para cresol

Buton MD-360 is formulated in such a manner to give a resin of relatively high viscosity. When used in premixes, compounds having good moulding characteristics result.

A-172 is a vinyl silane ester marketed by the Union Carbide Corp. It serves to bond the filler more effectively with the resin as will be discussed later. The 2,6-di-butyl para cresol is available under various trademark names and serves both as an inhibitor for the liquid resin and as an antioxidant for the cured premix. Ethylene dimethacrylate is now available commercially. It is used in the resin mix to facilitate the crosslinking reaction. Divinyl benzene may be used instead, or it may be omitted. The catalyst combination is the best of many tested.

We will designate the above resin composition, including the DMA and catalysts, as Resin A. Such a composition has a viscosity of about 50 poises. Several other hydrocarbon resin compositions for premixes have been studied, but Resin A is typical of the ones showing the most promise.

One characteristic of a resin mix based on MD-360 is its good viscosity index, *i.e.*, change of viscosity with temperature. This is illustrated by means of Fig. 1 where the viscosity indices of two MD-360 type mixes are compared with a general purpose hydrocarbon resin, Buton A-500. Buton A-500 is a liquid copolymer prepared from 80 parts of butadiene and 20 of styrene. The Buton A-500 was tested as an 80/20 blend with vinyl toluene. Two polyesters which have been recommended for premix preparations are also included for comparison. It will be noted that the viscosity curves for the MD-360 types are relatively flat as compared to the other three resins.

2. Reinforcement

Only glass fibres have been studied as reinforcing fibres. Most of our work has been done with Owens-Corning's HSI chopped glass fibres. Experimental samples of this glass containing three concentrations of binder were made available to us for testing. They consisted of HSI ¼in. fibres containing 3.3, 2.3 and 1.3% binder. When tested in the Buton Resin A formulation, that containing a 2.3% binder proved most applicable. Chopped fibres containing this binder are denoted by the manufacturer as TO43-B. Such glass contains a vinyl silane finish or coupling agent.

One-half inch HSI fibres behaved similarly to the ¼in. fibres based on the physical testing of moulded panels from the respective premixes. Chopped glass containing Owens-Corning's 830 Binder was studied in lengths of fibres up to 2in. The shorter length fibres proved superior based on both flexural and tensile data. The following physical test data were obtained from identical premix panels except that length of fibre was varied:

	¼in.	½in.	1in.	2in.
Flexural strength, psi	11,830	11,520	8,000	6,770
Tensile strength, psi	4,310	4,640	3,690	3,230

3. Fillers

Considerable work with clays (aluminium silicates) has been done as exemplified by the ASP series manufactured by the Minerals and Chemicals Corp. of America. An amorphous silica, Celite-270, marketed by Johns-Manville, was also studied in some detail.

The pertinent properties of these fillers are as follows:

	Average Particle Size microns	pH	Specific Gravity
ASP-100 ..	0.55	3.8—4.6	2.58
ASP-103 ..	0.55	6.3—6.7	2.58
ASP-400 ..	4.8	3.8—4.6	2.58
ASP-403 ..	4.8	6.3—6.7	2.58
Celite-270 ..	1—6	7.0	2.50

The 103 and 403 pigments are coated with a 'cationic surfactant

*Paper delivered at the recent annual meeting of the reinforced plastics division of the US Society of the Plastics Industry Inc.

organophilic'. When using the 100 and 400 type clays severe inhibition of the cure resulted, presumably due to the acid nature of such fillers. Use of 0.5% of lauryl dimethyl amine (Armeen-DM-12D marketed by Armour Chemical) dissolved in the resin when using ASP-100 or 400 resulted in premixes roughly comparable to when ASP-103 or 403 was employed. Also, no appreciable effect of particle size could be detected when the ASP materials were used in Buton premixes containing 30-40% glass.

Celite-270 contains 92% of free silica. This filler cannot be used with high-class fibre premixes (25-40%) because of poor flow properties. However, as will be pointed out below, use of this filler as a binary mixture with an all hydrocarbon resin results in mouldings of high strength as compared to the use of clays.

Other fillers studied, but not reported herewith in detail, included the resin-coated clays marketed by the Georgia Kaolin Co., finely ground quartz silica, aluminas, and carbonates. In general, any inorganic filler is suitable for use in Buton as long as it is neutral or alkaline in nature.

Preparation of Premixes and Test Specimens

Premixes containing resin, filler and chopped glass have been prepared in a Baker-Perkins Type 6-AN2 batch mixer of 3.5 gallons total capacity equipped with 180° twist blades with ¼in. clearance. The filler is first mixed with the resin followed by the addition of the chopped glass. There has been some evidence that 1,000 to 2,000psi higher flexural strengths are obtained with premixes in which the resin and clay have been mixed and then allowed to stand overnight before mixing in the glass.

When using a premix of resin and clay only it has been mixed on a laboratory mill designed for mixing paints or a small kneader. Use of the paint mill appears to result in a resin-filler mix which when cured has a slightly higher tensile strength as compared to when using kneader mixing.

As is well known, it is much more difficult to get good dispersion of a finely divided solid in a viscous liquid than it is in a rubbery solid. Because of the conditions of shear, fillers can be well dispersed in rubbery stocks when masticated on a mill or in a banbury. When one mixes a like filler in a liquid resin about all one can hope to do is to break up the macro agglomerates. Thus particle size is not as significant when preparing resin premixes as it is with plastics and rubbers generally.

Panels or sheets of premixes for testing were usually prepared by moulding in a 5 x 9 x ¼in. cavity mould and heated in a Pasedena press equipped with 12½ x 18in. platens, Mylar (1mil.) film was used to avoid mould sticking. Since the moulds were at room temperature when charged to the press, actual curing times reported are longer than those which would be required in a matched metal mould. Curing in a variety of moulds has indicated that premix compounds based on Resin A can be satisfactorily moulded and cured into intricate shapes. Of the various mould release agents tested, Zelec, a Du Pont product, was most effective with the Buton premixes.

Most of the physical testing was done on 3 x ½in. specimens cut from the cured panels. In some cases, the panel was cut into halves and one half submitted to a post cure for one hour in an oven in order to determine if full cure had been obtained. In other cases separate panels were used for post curing. In all tests a minimum of two like specimens were tested and usually three or more. If greater than 10% deviation in like test specimens resulted, additional specimens were tested until three within the 10% deviation were obtained.

Laboratory Data

Work to date on premixes containing resin, glass, and filler have been primarily of high glass content. Flexural and tensile strengths determined at room temperature and flexural strength after one week immersed in boiling water have been the primary tests for determining premix quality and state of cure.

(1) *Ternary Mixes of Resin, Glass, Filler*

By employing several intricate moulding operations, the effect of composition has been studied for premixes containing Buton resin, HSI ¼in. chopped fibres, and ASP-103 clay. From this work the following conclusions were made:

(a) Use of Resin A resulted in better moulding from the standpoint of crazing or cracking in large diameter pieces as compared to Buton resins of lower viscosities and comparable polymer content.

(b) Use of three parts of asbestos powder in the premix improves surface characteristics of the mouldings and the handling characteristics.

(c) A maximum of 38% chopped glass can be employed and still have good mouldability.

The following premix appears to be generally applicable and has been used in much of our available studies:

Resin	33
ASP-103	30
Asbestos 7 TF.. ..	3
¼in. HSI glass ..	33

Table 1 summarizes physical test data obtained on specimens cut from panels prepared from such a premix as well as those of higher and lower glass contents. Those of 30-40% glass had notched Izod impact values of 6 to 7ft./lb./in. Water resistance as reported here is good with 3 x ½ x ¼in. specimens cut from cured panels retaining up to about 85% of their flexural strength after immersion for one week in boiling water. Preliminary data indicate that such cured premixes do not further deteriorate on exposure to boiling water and may actually regain a part of the strength lost. Also, indications are that the glass is the primary point of deterioration by water rather than the resin or filler. Both of these factors will be further discussed under the next section of this report.

The cure time of Buton premixes can be decreased with increase in temperature. When curing at 380°F. for 3min. a flexural strength of 8-10,000psi is obtained which can be increased to 12-13,000psi by a post

TABLE 1
BUTON PREMIXES CONTAINING GLASS(a)

Post Cure	Relative Proportion Resin	ASP	HSI	AS	Flexible Strength, psi	Tensile Strength, psi	After 1 Week Boil Flexible Strength
No	27	30	40	3	16,200	6,470	11,190
Yes	27	30	40	3	14,350	6,400	11,170
No	29	30	38	3	13,000	5,400	8,100
Yes	29	30	38	3	16,300	7,260	11,500
No	33	30	33	3	15,400	6,530	11,500
Yes	33	30	33	3	16,000	7,100	11,700
No	50	35(b)	15	—	9,950	4,550	8,360
Yes	50	35(b)	15	—	13,300	7,000	11,500
No	46	34(b)	20	—	—	—	—
Yes	46	34(b)	20	—	14,300	6,500	—

(a) A resin formulation used. Cure in mould was for 10 min. at 360°F. Post cure was in air oven for an additional one hour at 350°F.
(b) Celite-270 amorphous silica used instead of the ASP-103 clay.

cure of one hour at 350°F. Cure temperatures above 380°F. appear to be impractical due to rapid fall off in strength of the mouldings.

When using Celite-270 as filler in the ternary mixture, it is necessary to increase the proportion of resin and decrease that of glass in order to get proper flow characteristics. However, as shown in Table 1 such premixes compare favourably in strength to those of higher glass content.

(2) *Binary Mixes of Resin, Filler*

As pointed out by Sidlovsky[5], use of a vinyl silane derivative for coating the clay filler used in polyester reinforced plastics results in improved strength and electrical properties. To our knowledge, there is no filler available today on a commercial scale which contains a 'finish'. As previously reported, in case of using an all hydrocarbon resin for preparing glass cloth laminates, it is nearly as effective to add the silane finish as its ester to the resin and use heat-cleaned glass, as it is to apply the silane to the glass prior to contacting with the resin[4]. This approach has now been used in our study of fillers.

In order to simplify the study of vinyl silane-coated fillers in Buton resins, the glass fibre reinforcement was omitted in the mixes. Clays were first studied in such a binary system, along with wood flour and the amorphous silica, Celite-270. Typical data are summarized in Table 2. In these runs comparisons were made when using Buton (Resin A) as is, adding 1.5% of A-172 Silane ester to the resin, and adding 1.5% of both A-172 and water. The purpose of the water was to assure hydrolysis of the A-172. Although the stoichiometric ratio of A-172 to water is 1/0.2 for complete hydrolysis to the silanol, the excess of water was employed to assure an adequate proportion in spite of any evaporation losses during handling.

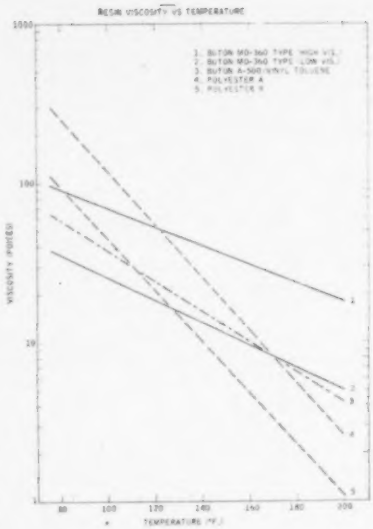

Fig. 1

All ingredients were dissolved in the resin before mixing in the water. Addition of the water results in a milkiness to the resin which remains well suspended on standing. Due to the high curing temperature of the resin, any excess water is evaporated prior to reaching gelation temperature.

An indicated in Table 2, use of the A-172 in the wood flour imparts some improved water resistance to the moulding. However, as expected, addition of water along with the A-172 was overall harmful, presumably due to the hydrophilic nature of the wood. When using the coated clay, ASP-403, presence of the A-172 improved original strength and water resistance. Presence of water with the A-172 slowed reaction rate. With the raw clay, ASP-400, both the A-172 and the A-172-water combination decrease reaction rate. This is likely due to an initial reaction between the free amine, used in the resin to neutralize the acidity of the clay, and the silane ester. However, the performance of the silica filler, Celite-270, is greatly improved in overall strength, and particularly to resistance to boiling water, when A-172 is included in the resin mix.

The increase in flexural strength of the samples with Celite 270 filler after immersion in boiling water is shown for the post cured samples containing the vinyl silane. This increase is real and is usually obtained with a properly formulated all hydrocarbon resin mix such as Resin A and a silica filler such as Celite-270 or ground quartz. On the surface, this might appear to be a matter of increasing the state of cure. However, this does not appear to be the sole explanation, but rather is due to something more fundamental. The boiling water may serve to remove gas bubbles from the moulding. Diffusion of traces of water into the specimen may also serve to hydrolyze any unreacted ester groups of the silane thus improving bonding of resin to filler.

Table 3 summarizes data from runs in which an attempt was made to find the effect of A-172 concentration in the resin when using 100 parts of resin per 75 parts of Celite, and the best hydrolyzing agent to use with the A-172. Results are not as consistent as one would like, probably because only one test panel was made in each case, but they do indicate the following:

(1) It does not appear necessary to modify the pH of the water by either formic acid or morpholine.

(2) Although water is injurious in the premix, when used in combination with the A-172 it is beneficial.

(3) Use of 0.5-1.0 part of A-172 per 75 parts of Celite-270 appears adequate.

Celite-270 as delivered may contain up to 1% water and is fairly hydroscopic. In the above runs the Celite was used from the shipping bag as received. Water on the surface of the Celite would serve largely the same purpose as adding it to the resin prior to mixing with the Celite filler. In order to eliminate the effect of adsorbed water on the Celite, a quantity of this filler was thoroughly dried by heating at 250°F. in an air circulating oven for 16 hours, cooled in a closed container and used in the Buton resin similarly as the runs cited in Tables 2 and 3. The following test data was obtained:

Additive to Resin	Tensile Strength	Flexural Strength After R.T.	Flexural Strength After 1 Wk. Boil
1.5% A-172	6,050	12,200	9,400
1.5% A-172	6,050	11,200	13,900
0.6%, 10% Formic			
1.5% A-172 1.2%, 10% Formic	7,550	11,400	12,500

TABLE 2

EFFECT A-172 IN HYDROCARBON RESINS(a) WITH DIFFERENT FILLERS

Filler	Additives to Resin		After Mould Cure Flexural Strength After			After Post Cure Flexural Strength After		
	A-172	Water	R.T.	1 Wk. Boil	Tensile	R.T.	1 Wk. Boil	Tensile
Wood Flour(b)	None	None	4,570	—	2,500	5,800	1,930	2,800
Wood Flour(b)	1.5%	None	3,700	—	2,300	7,500	2,770	4,500
Wood Flour(b)	1.5%	1.5%	1,130	—	1,400	2,800	1,040	2,680
ASP-403(b)	None	None	5,680	5,770	3,160	7,550	5,550	4,100
ASP-403(b)	1.5	None	6,170	6,160	3,640	8,470	7,600	5,160
ASP-403(b)	1.5	1.5	3,000	3,150	1,820	8,220	8,300	4,560
ASP-400(b)	None	None	6,150	5,860	2,990	7,400	5,940	4,520
ASP-400(b)	1.5	None	2,400	2,280	1,490	8,000	6,500	5,200
ASP-400(b)	1.5	1.5	2,470	3,580	1,200	7,570	7,500	3,410
Celite-270(c)	None	None	6,880	4,800	3,990	9,700	5,800	5,300
Celite-270(c)	1.5	None	6,700	6,500	3,040	13,500	15,900	7,140
Celite-270(c)	1.5	1.5	8,450	9,580	4,500	12,550	15,000	6,600

(a) Formula A used.
(b) Used in proportion of 100 resin/100 filler.
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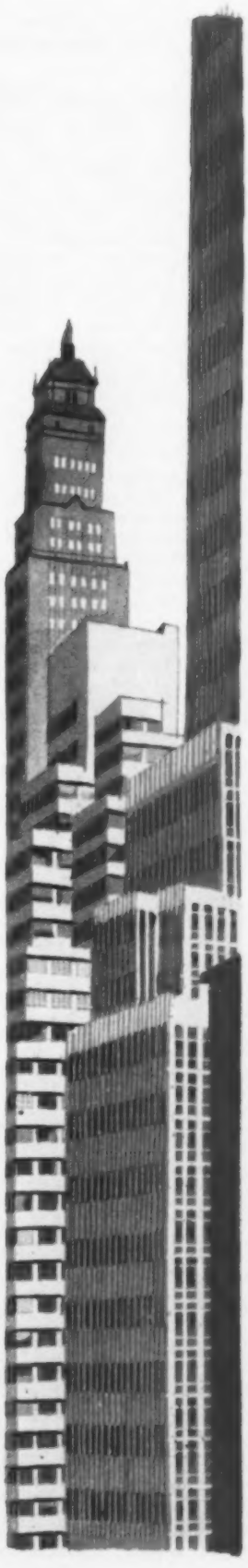

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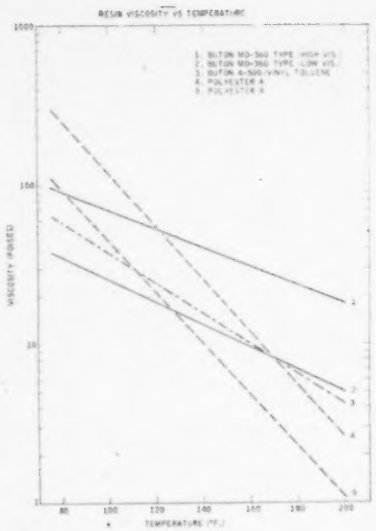

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Celite-270 as delivered may contain up to 1% water and is fairly hydroscopic. In the above runs the Celite was used from the shipping bag as received. Water on the surface of the Celite would serve largely the same purpose as adding it to the resin prior to mixing with the Celite filler. In order to eliminate the effect of adsorbed water on the Celite, a quantity of this filler was thoroughly dried by heating at 250°F. in an air circulating oven for 16 hours, cooled in a closed container and used in the Buton resin similarly as the runs cited in Tables 2 and 3. The following test data was obtained:

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1.5% A-172	6,050	12,200	9,400
1.5% A-172 0.6%, 10% Formic	6,050	11,200	13,900
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Filler	Additives to Resin		After Mould Cure Flexural Strength After			After Post Cure Flexural Strength After		
	A-172	Water	R.T.	1 Wk. Boil	Tensile	R.T.	1 Wk. Boil	Tensile
Wood Flour(b)	None	None	4,570	—	2,500	5,800	1,930	2,800
Wood Flour(b)	1.5%	None	3,700	—	2,300	7,500	2,770	4,500
Wood Flour(b)	1.5%	1.5%	1,130	—	1,400	2,800	1,040	2,680
ASP-403(b)	None	None	5,680	5,770	3,160	7,550	5,550	4,100
ASP-403(b)	1.5	None	6,170	6,160	3,640	8,470	7,600	5,160
ASP-403(b)	1.5	1.5	3,000	3,150	1,820	8,220	8,300	4,560
ASP-400(b)	None	None	6,150	5,860	2,990	7,400	5,940	4,520
ASP-400(b)	1.5	None	2,400	2,280	1,490	8,000	6,500	5,200
ASP-400(b)	1.5	1.5	2,470	3,580	1,200	7,570	7,500	3,410
Celite-270(c)	None	None	6,880	4,800	3,990	9,700	5,800	5,300
Celite-270(c)	1.5	None	6,700	6,500	3,040	13,500	15,900	7,140
Celite-270(c)	1.5	1.5	8,450	9,580	4,500	12,550	15,000	6,600

(a) Formula A used.
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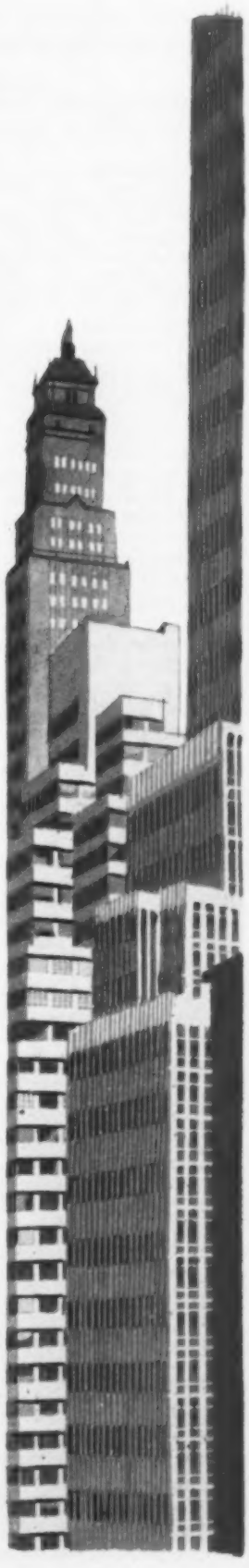

TABLE 3
EFFECT A-172 ON CELITE-270 WITH DIFFERENT HYDROLYZING AGENTS

Additives to Resin(b) A-172	Other	After Mould Cure(a) Flexural Strength, psi R.T.	After 1 Wk. Boil	Tensile	Barcol	After Post Cure Flexural Strength, psi R.T.	After 1 Wk. Boil	Tensile	Barcol
1.5%	1.5% Water	8,450	9,580	4,500	31	12,550	15,000	6,600	47
1.5	1% Water	9,650	11,100	4,500	42	12,700	11,200	6,500	50
1.5	1%, 10% Formic Acid	8,200	11,450	5,100	41	12,100	12,050	4,420	48
1.5	1%, 10% Morpholine	4,650	6,620	3,500	0	12,800	11,800	7,700	51
1.0	1% Water	7,650	10,000	5,100	31	13,300	12,400	7,000	56
1.0	0.5% Water	5,000	9,400	3,400	0	10,600	13,000	7,600	51
0.5	1% Water	6,400	8,050	4,200	23	13,750	12,900	7,050	51
0	1.5% Water	5,700	3,960	3,400	16	7,050	4,520	3,900	38

(a) A 100/75 blend of Resin-A and Celite-270 cured for 10 min. at 360°F. Post cure was one hour at 350°F. in oven.
(b) Same as Resin-A but proportion of A-172 varied as shown and hydrolyzing agent added as shown.

Apparently the A-172 silane ester tends to migrate to the surface of the silica, but if water is not present, so that the ester groups are hydrolyzed to hydroxyls and become attached to the silica surface, the silane does not adequately protect the silica when the cured premix is immersed in boiling water. Partial hydrolysis of the silane ester prior to contacting with the silica filler no doubt increases its tendency to migrate to, and to become attached to, the silica surface. The tendency of silanols to form condensed siloxanes complicates any deductions which one might make as to the best procedure for applying a vinyl silane 'finish' to a filler from a solution of A-172, or equivalent, in a resin. The amount of silane required will no doubt vary with the surface area of the filler; and the amount of water to be added, if any, will depend upon the amount and nature of the adsorbed water on the filler.

Since amorphous silicas responded to the use of vinyl silane coupling agent more so than did the aluminum silicates, crystalline silica, as exemplified by quartz, was tried as filler. It was tested alone and in combination with Celite-270. The quartz employed was Potter's Flint obtained from the United Clay Mines Corporation. It was reported to be over 99.92% SiO_2 as quartz and specified as 200 mesh maximum in particle size. Two hundred mesh corresponds to 74 microns.

Table 4 summarizes some runs made with this interesting filler. As may be seen from the first entry in the table, it is substantially useless as a filler unless the vinyl silane coupling agent is used. However, once A-172 is used in the resin, cured panels containing 77% of filler were obtained which had 14,000psi flexural strength and 7,000psi tensile strength, which are at least equivalent to those with a much lower proportion of the smaller particle size and higher cost amorphous silica. When using the high proportion of ground quartz, the cured panels had Barcol Hardness values as high as 68. Further studies with ground quartz has included 100 mesh material as well as some of 5 microns maximum in diameter. Surprisingly, the larger size quartz powders appear to be as effective with Buton resins as those of the more conventional particle size used as fillers in premixes. However, use of a suitable vinyl silane ester in the resin mix is absolutely necessary in order to get mouldings of utility when using the large particle size quartz powders.

TABLE 4
PREMIXES CONTAINING GROUND QUARTZ SAND

Filler per 100 of Resin(a) Celite-270	Ground Sand(b)	Post Cure	Flexural Strength, psi Original	After 1 Wk. Boil	Tensile	Izod Notched
—	333(c)	No	2,220	1,200	1,600	0.32
—	333(c)	Yes	4,750	3,800	2,800	
—	333	No	12,900	13,900	5,800	0.69
—	333	Yes	14,400	15,200	7,200	
—	333(d)	No	10,700	10,700	5,200	0.36
—	333(d)	Yes	13,800	14,400	7,100	
50	100	No	12,100	13,400	6,700	0.29
—	—	Yes	13,000	14,000	7,080	
62	63	No	4,700	8,850	2,500	
—	—	Yes	11,300	14,000	5,800	0.34

(a) Buton Resin A was used but modified in that the proportion of A-172 was increased to 1.5 parts and 1.0 part of water was also added. Cure was at 360°F. for 10 min. and that post cured was heated in an oven for 1 hr. at 350°F.
(b) Potter's Flint, 200 mesh ground quartz sand.
(c) No A-172 or water used in resin.
(d) As preceding run, but cure time was 5 min. instead of 10.

Use of a premix consisting of 75-80% of a filler costing less than a cent per lb. offers the possibility of very low cost moulding compounds. As expected, impact resistance is low as compared to premixes high in fibre content. Work with sisal and other bulk fibres show that use of 5-10% of fibres with the high proportion of quartz powder results in cured panels of notched Izod values greater than 1.0.

As pointed out by Michaels[5] and others, the optimum combinations of relatively large and small particles allow maximum loading and the avoidance of resin rich voids between the particles. Work along this line with silica type fillers in Buton premixes is in progress.

Results from resin-clay mixes in which the vinyl silane was added via the resin were compared with those obtained when the filler was precoated. Samples of ASP-400 clays were coated with the silane using a hydrolyzed ester (A-172) or vinyl trichlorosilane. These preparations were carried out by the Silicones Division of the Union Carbide Corp. They were tested in Resin A except that no A-172 was used in the resin. As a whole, the results with these silane-coated clays were inferior to those obtained when adding the silane via the resin, a much simpler and cheaper method.

A sample of ASP-403 (cationic-coated clay) which was subsequently treated with 1.2% of vinyl trichlorosilane by Carbide give much inferior results when used as filler in the Buton. This acid chloride or the by-product hydrogen chloride apparently attacks the coating on the clay.

Resistance to Chemicals and Solvents

Studies carried out on the resistance of Buton premixes to chemicals and solvents have been limited. Test specimens from panels containing glass, clay, and resin immersed in transformer oil for 55 hours at 350°F. showed no loss in either flexural or tensile strength. Table 5 shows the effect of several chemicals on the cured Buton premix containing glass and clay filler. Based on the chemical nature of the Buton, as well as the test data here reported, it is to be expected that Buton premixes have good resistance to chemicals generally. Their resistance to solvents, also, should in general be good.

Electrical Properties of Buton Premixes

An all hydrocarbon resin possesses considerable potential in the electric field. High resistance, low loss factor and dielectric constant, high dielectric strength, and good arc resistance have been reported for the Buton casting and glass cloth laminates[2]. It should be possible to carry these good electrical properties over to Buton premixes. Although our work has been limited in this respect, this appears to be the case. The following data were obtained on the following panels:

(1) Buton-HSI Glass-ASP-103 in 33/33/30 proportion.

(2) Buton-Celite-270 in 100/75 proportion.

	Panel No. 1	Panel No. 2
Dielectric constant ..	4.68	3.21
Dissipation factor ..	0.017	0.005
Volume resistivity ..	2.83×10^{14}	2.98×10^{15}

It will be noted that Panel No. 2 which contains no glass has the better electrical properties.

TABLE 5
CHEMICAL RESISTANCE OF PREMIX(a)

	% Change, 76°F.					% Change, 158°F.(b)				
	Weight		Shore Hard.		Flex. Str.	Weight		Shore Hard.		Flex. Str.
	3 Mo.	4 Mo.	3 Mo.	4 Mo.	4 Mo.	3 Mo.	4 Mo.	3 Mo.	4 Mo.	4 Mo.
Distilled water ..	+1	+1	—1	—4	— 4	+ 1	+ 1	— 2	— 4	—10
20% sodium hydroxide	+9	+10	—8	—8	—34	+23	+23	— 7	— 6	—57
50% sulphuric acid ..	+1	+2	—1	—7	—30	+20	+23	—20	—24	—66
37.5% hydrochloric acid	+5	+5	—9	—9	—35	+ 1	+ 1	—22	—20	—91
Glacial acetic acid ..	+4	+5	—4	—4	—42	+ 8	+ 8	— 8	—12	—36
85% phosphoric acid ..	+0.5	+0.5	+1	+1	+14	+ 2	+ 2	— 6	— 7	—13
15% sodium hypochloride ..	+1	+1	—2	—2	—21	+ 1	+ 1	— 6	— 7	—11
15% ferric chloride ..	+0.5	+0.5	—6	—2	+13	+ 1	+ 1	— 7	— 5	— 7
15% stannous chloride	—3	—3	—9	—9	—32	+0.5	+ 1	—15	—21	—51
37.5% formaldehyde	+1	+1	—4	—2	+ 6	+ 3	+ 3	— 5	— 6	+ 3

(a) Premix prepared with the A formulation and 33/33/30 mixture with HSI glass and ASP-103 filler. Cure was 10 min. at 360°F.
(b) Tested at 76°F. after exposure at 158°F.

Conclusions

Hydrocarbon thermosetting resins of the Buton type show promise for the preparation of premixes. Buton resins show a relatively low change of viscosity with temperature as compared to the polyesters. Premixes based on such a resin and containing chopped glass and an inorganic filler have good moulding characteristics and give mouldings of good resistance to most aqueous liquids.

Due to the absence of polar groups in a hydrocarbon resin, it is possible to apply a silane 'finish' to the reinforcement and filler of a premix by adding the silane as an ester in solution in the resin. Adding a little water to the resin facilitates the hydrolysis and adsorption of the silane on the reinforcement and filler. A suitable vinyl silane ester for this purpose is A-172, which is manufactured by Union Carbide.

Use of A-172 with a silica type filler is more effective than with the clay type. By use of 0.5-1.5% of A-172 in a Buton resin, cured premixes containing only resin and silica filler have been prepared which have flexural and tensile strengths nearly comparable to those obtained with clay and chopped glass. Use of the silane coupling agent also makes possible the effective use of coarse fillers such as 200 mesh ground quartz. Such fillers can make up about 80% of the total premix and still result in compounds of good mouldability and high strength. Quartz has such outstanding properties as high chemical resistance, low water adsorption, excellent electrical properties, and a low thermal coefficient of expansion. Hydrocarbon resins are characterized by chemical inertness, low water absorption, and good electrical properties. Premixes containing a high proportion of ground quartz with such a resin should have many unique and valuable properties.

Acknowledgment

The authors wish to acknowledge the co-operation of several of their colleagues at Esso Research and Engineering Co. in getting some of the data reported herein. Thanks are due to the Spiral-Glas Pipe Co. for testing the mouldability of many of the premixes discussed here. Support of this work by various affiliates of the Standard Oil Co. (NJ) is sincerely appreciated.

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UK Stockpile Disposals

Sales from the Board of Trade's stock of natural rubber in May totalled 515 tons, for delivery: Spot 110 tons; June 30 tons; July 310 tons; and August 65 tons.

The amount available for sale on June 1 totalled 26,590 tons.

The Lord Mayor of Liverpool was among the many hundreds of parents and young people who visited a Rubber Industry Exhibition at Old Swan Technical College, Liverpool, organized as part of Commonwealth Technical Training Week. The exhibition showed the story of rubber from the plantations through the compounding and manufacturing stages to the final products. In this picture F. G. W. Jackson (Dunlop Rubber Co. Ltd.) is explaining a point to a party of schoolboys

AMERICAN LETTER — from Norman L. Hewitt

1001 Plastics Items at the Coliseum

DU PONT FILES POLYFORMALDEHYDE SUIT AGAINST CELANESE

SHORTLY before the UK's own plastics exhibition, Interplas, the largest plastics convocation in America took place from June 5 to 9 at the New York Coliseum, when the Society of the Plastics Industry Inc. sponsored the ninth National Plastics Exposition. More than 250 participating companies were exhibiting machinery, chemicals, building supplies, aircraft parts, food products, textiles, cosmetics, and a 1,001 other plastics-oriented items to about 40,000 registrants.

While plastics' substantial rewards were on view at the Coliseum (hinted at in the exposition's slogan, 'Come Profit with Plastics in the four billion dollar Marketplace'), the more subdued side of the industry was being explored in a series of conferences and lectures at the Hotel Commodore. These sessions included the materials, design, marketing, and production aspects of the various product classes, ranging from appliances to defence. In addition to the product conferences, the SPI divisions of Thermoplastic Structures, Epoxy Resin Formulators, Vinyl Dispersions, and Cellular Plastics held their annual seminars.

From the car industry, Thomas H. Risk, of the Ford Motor Co., spoke on current uses and requirements of plastics in cars. Packaging matters were reviewed by F. E. Long, of Continental Can's flexible packaging division; A. J. Sanders, of Colgate-Palmolive, spoke of household bottles and tubes; and Lily Tulip's F. N. Hartmann on rigid containers. In the communications field, C. J. Martin, of RCA, had much of interest for both users and makers of records and tape recorders in his talk on 'Plastics in the Recording Arts'. The lately more popular topic of space travel was discussed by Eric Linden, of the Fort Monmouth Civilian Signal Communication Laboratories, who examined such factors as X-rays, cosmic rays, ultra-violet light, and vaporization under vacuum, and their effect on plastics. Actual applications of plastics in military weapons, satellites and missiles were described by representatives of the Naval Ordnance Laboratory, The Office of the Director of Defence, The Bureau of Ships, and General Electric.

Polyformaldehyde Storm Breaks

The threatening storm cloud which has slowly taken shape over the heads of those companies venturing into the production of polyformaldehyde resins broke in April as Du Pont (Delrin) filed a patent infringement suit against Celanese (Celcon) in the US District Court of Delaware. Other US formaldehyde producers vitally interested in the outcome of the case include Heyden-Newport, Borden and Reichold, all of whom are in the acetyl polymer development stage.

Outside USA, the Catalytic Chemical Industry Co., of Osaka, Japan, is building a pilot plant for polyacetal resins. With the tank car price of formaldehyde at 3¾ cents a lb., the current price of Delrin at 65 cents a lb., and the 1965 market estimate at 100m. lb., the economic attractions are powerful.

The Du Pont composition-of-matter Patent No. 2,768,994 covering crystalline polyformaldehyde was issued in 1956. Celanese also has a patent — on a process for the continuous production of polyformaldehyde from trioxane — but no claims on the product itself. The Celanese defence rests on the fact that Celcon is a copolymer of formaldehyde plus an olefin or other monomer, that its starting material is trioxane, and that its structure is different from that of Delrin.

In terms of properties, an abbreviated list shows that there are few differences between the competing resins: —

Property	*Delrin*	*Celcon*
Specific gravity ..	1.43	1.41
Tensile (psi) ..	10,000	8,000
Elongation (%) ..	15 to 75	40
Izod impact	1.4 to 2.3	1.1
Flexural strength (psi)	14,000	12,000
Heat distortion (264psi)	212°F.	230°F.
Water absorption (24hrs)%	0.12	0.25

The first years of Delrin's commercial life have been marked by rapid acceptance in many fields as a metal replacement. Recently Ford announced its use for truck door handles and window regulators. Here die cast zinc was replaced. Other car applications include parking brake pulley, radio parts, bearings that are greased for life, light sockets, instrument panel knobs, and assorted lever handles. In about 10% of the items, nylon — rather than metal — is replaced.

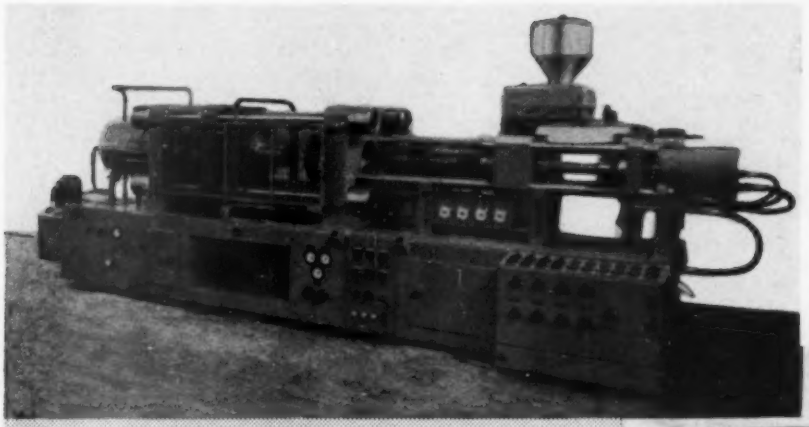
Chemically related to the acetals, but functionally distinct, are the new polyspiro-acetal resins of Shawingan and Chemstrand. Shawingan's product is a pentaerythritol gultaraldehyde which has shown promise as a coating, particularly for electrical insulation (wire enamel).

The stability of the resin is imparted by a highly ordered chain structure. Pentaerythritol is reacted with a dialdehyde (*e.g.*, glutaraldehyde) to give a linear chain composed largely of cyclic acetal units. The 'spiro' designation refers to the central carbon atom of the PE, which is common to two rings in the polymer. Cross-linking sites are provided for by di-PE, which makes up about 12% of 'technical' pentaerythritol. Each molecule of di-PE included in the polymer supplies two hydroxyl groups. Preferred molecular weight of the resin is about 1,000; cross-linking sets the material to provide a melting point of 220°C.

Backyard Plastics

It has been said that at one time the bulk of the American plastics industry was housed in discarded garages. This may or may not be literally true, but the inference that plastics manufacture is well suited to the resources of the pioneer entrepreneur is certainly accurate. Both processes and materials have made it feasible — if not easy — for a man with no previous technical training to produce plastics products.

One rather interesting, and typical, example of the manner in which many of this country's plastics companies have originated is the history of the United Progress Corp., of Albany, New York. Ray van den Houten, president of United Progress, has been and remains a well-known figure in the construction field. Several years ago he was faced with an extra-curricula problem of supplying bumpers for the boat dock of his



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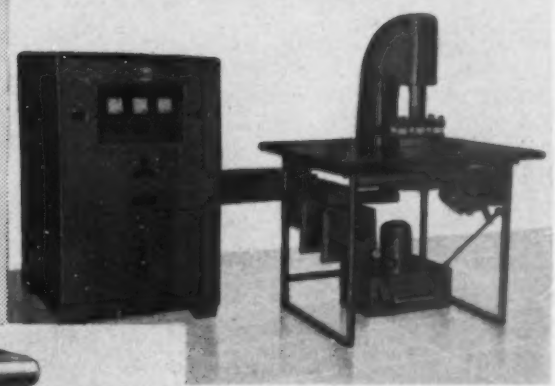

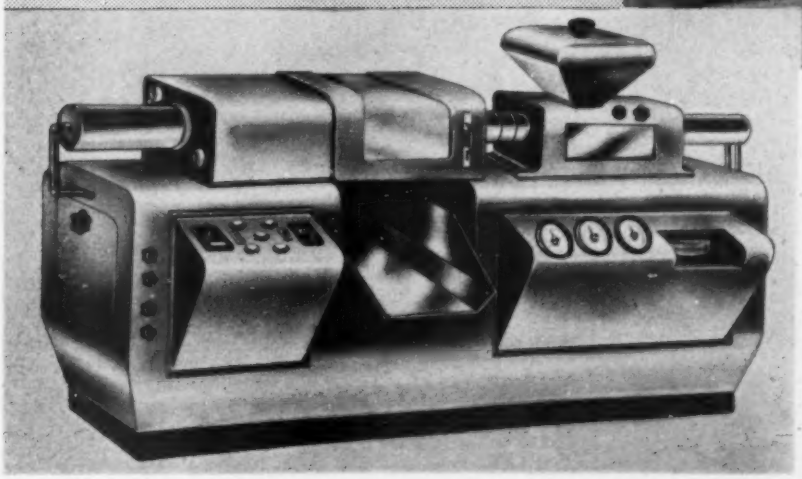

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summer camp. A Koppers Co. advertisement for Dylite expanded polystyrene looked promising, and samples were requested. Although expanded polystyrene is definitely not robust enough to fend off boat impacts, it is, of all new plastics forms, the most versatile and easiest to shape. Accordingly, Mr van den Houten, with thoroughly aroused inventive and business instincts, shifted his attention to the use of Dylite in swim buoys and floats.

The first samples were made in cupcake moulds, expanded in the kitchen oven. Their success with the marine elements — both teenagers and sportsmen of the community — led to further and more professional trials for production in the construction company's machine shop. Since moulds, pressures, and thermal requirements are all moderate, it was with a relatively small capital expense that United Progress commercial production soon started. During the course of early process experiments, a new type of steam chest heating was developed for the expanding step, and new departures in mould design were made. In the second year's operation, diversification into construction panels and packaging applications took place. United Progress Corp. is now well established — along with many others — and a field whose sales volume will soon reach 50m. lb.

Disputes over US Plastics Institute

The continuing organizational activities for the new Plastics Institute of America are well advanced toward the long deferred goal of establishing the first group in USA devoted to basic research and education in plastics. The legal task of incorporating has been accomplished, and present temporary officers, headed by Jules Lindau of Southern Plastics Co. (Columbia, South Carolina), will serve only until the first formal election in September or Otcober. A new building will rise on the campus of a yet-to-be-selected university, probably eastern, and possibly Princeton, where a plot on the shores of Lake Carnegie (site of many a football Saturday picnic) is under consideration.

The Institute's new home will be the site of the three major activities which comprise the basic purpose of the non-profit organization: research, education, and literature. Basic research projects will include engineering studies of equipment, processing and fabricating, as well as chemical and physical studies of materials. The educational programme will be on the graduate level, with courses from the regular university catalogue combined with new Institute courses and thesis in plastics leading to a graduate degree (Masters or PhD). A continuing library effort will not only abstract the literature for plastics, but also collate existing data into tables and charts.

At present the membership of the new institute comprises 130 companies, each of which contributes a yearly sum of from $250 to $5,000, based on annual sales and degree of activity. The relatively low maximum amount was specified to prevent undue influence by one or several of the more affluent members.

The opinions and issues which took shape during the five-year effort to form the Plastics Institute have been well summarized in *Materials Engineering's* news release: —

'The Plastics Institute Committee, though it considers itself an independent body, has received a great deal of its financial support from the Society of Plastics Engineers. As a result, it has been known to many, though inaccurately, as "an SPE committee".

'The difference in attitude between SPI on the one hand and SPE on the other seems to reflect the differences in membership and character of the two groups. SPE is heavily oriented toward plastics converters, processors and users, and SPI leans toward the basic materials producers.

'The position of the materials producers is not hard to understand. They have always been heavily research-minded and have extensive facilities and programmes of their own. Although they seem to be unanimous in not wishing to contribute to, or participate in, a Plastics Institute, some of them are not willing to oppose actively the formation of the Institute.

'Monsanto's Plastics Division, for example, in refusing to participate itself, suggested that the Institute devote itself to application research in an effort to develop new products and outlets for plastics. With its extensive research facilities, Monsanto believes it has little to gain from the Institute and that perhaps the major industry problem now is the excess of manufacturing capacity over consuming capacity.

'A Du Pont spokesman says simply that there is "quite an adequate and growing basic research effort in plastics".

'Underlying many of the objections to the Institute idea among the large companies is the distaste for centralized, or "socialized", research and a fear that a company's competitive edge in a certain area might become dulled in a co-operative effort. These companies would prefer to shoulder important research problems themselves, hoping to capitalize on the results later on.

'Proponents of the Institute point to wasteful duplication of research effort and emphasise the importance of the advancement of the plastics industry as a whole. Many of them are medium-sized organizations that feel they cannot afford to "go it alone" in solving certain specialized problems that the materials producers likewise cannot afford to solve unless a major market is involved.

'Not all the converters, processors and major plant users of plastics are interested in supporting the proposed Institute, however. But it is certain that many such companies have next to nothing in the way of a research budget and, though willing to be helped by the industry, do not intend to pay for it directly — at least not at the rates suggested by the Plastics Institute Committee in its current survey'.

New Materials

Ethylene copolymers from Dow, Union Carbide, and Du Pont have all been introduced within the last month. The former two companies have developed ethyl acrylate-ethylene materials which attain the flexibility of plasticized pvc without the use of external plasticizer. The Du Pont product is a copolymer of vinyl acetate and ethylene, to be known as Elvax. Suggested applications are to toughen and up-grade waxes, and to form a base for adhesives. From 10% to 30% in waxes gives a proportional improvement in properties until, at the upper concentration, the mixture behaves as a polymer.

A new factory in Orange, Texas, will produce Elvax in commercial quantities (at 55 cents a lb.) by the end of 1962. At the same location, construction of an additional high pressure polythene facility will proceed immediately. It would appear from this that the old style resin is more than holding its own among the many high-density newcomers.

Another introduction from the ubitquitous Wilmington firm is a high temperature resistant polyamide fibre. A pilot plant at Richmond, Virginia (site of Du Pont's rayon and nylon production) will produce sufficient quantities (1m. lb.) of the HT-1 fibre to evaluate for electrical insulation, hot gas filtration, reinforcements, and military uses. The reported operating temperature of 840°F. has aroused Air Force interest in its space applications.

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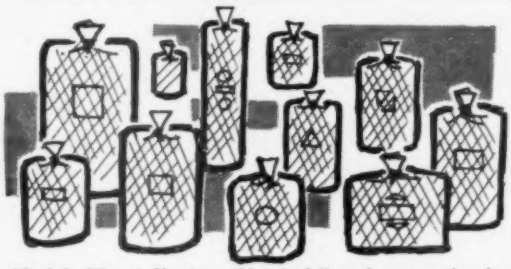

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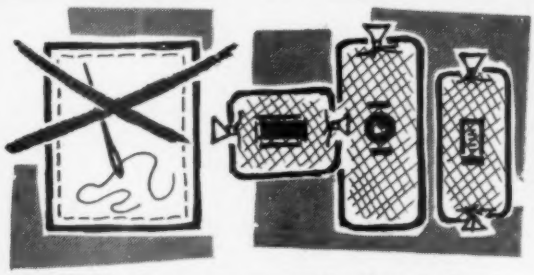

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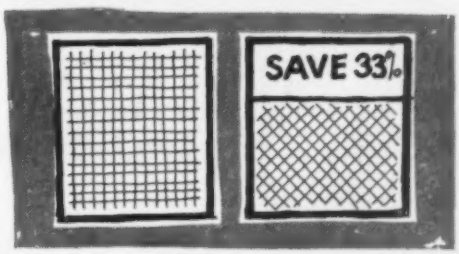

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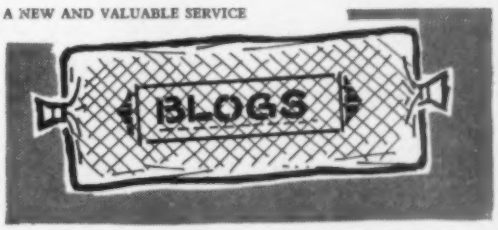

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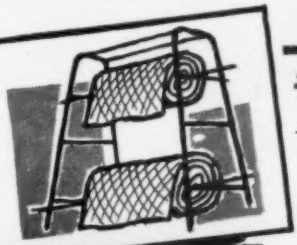

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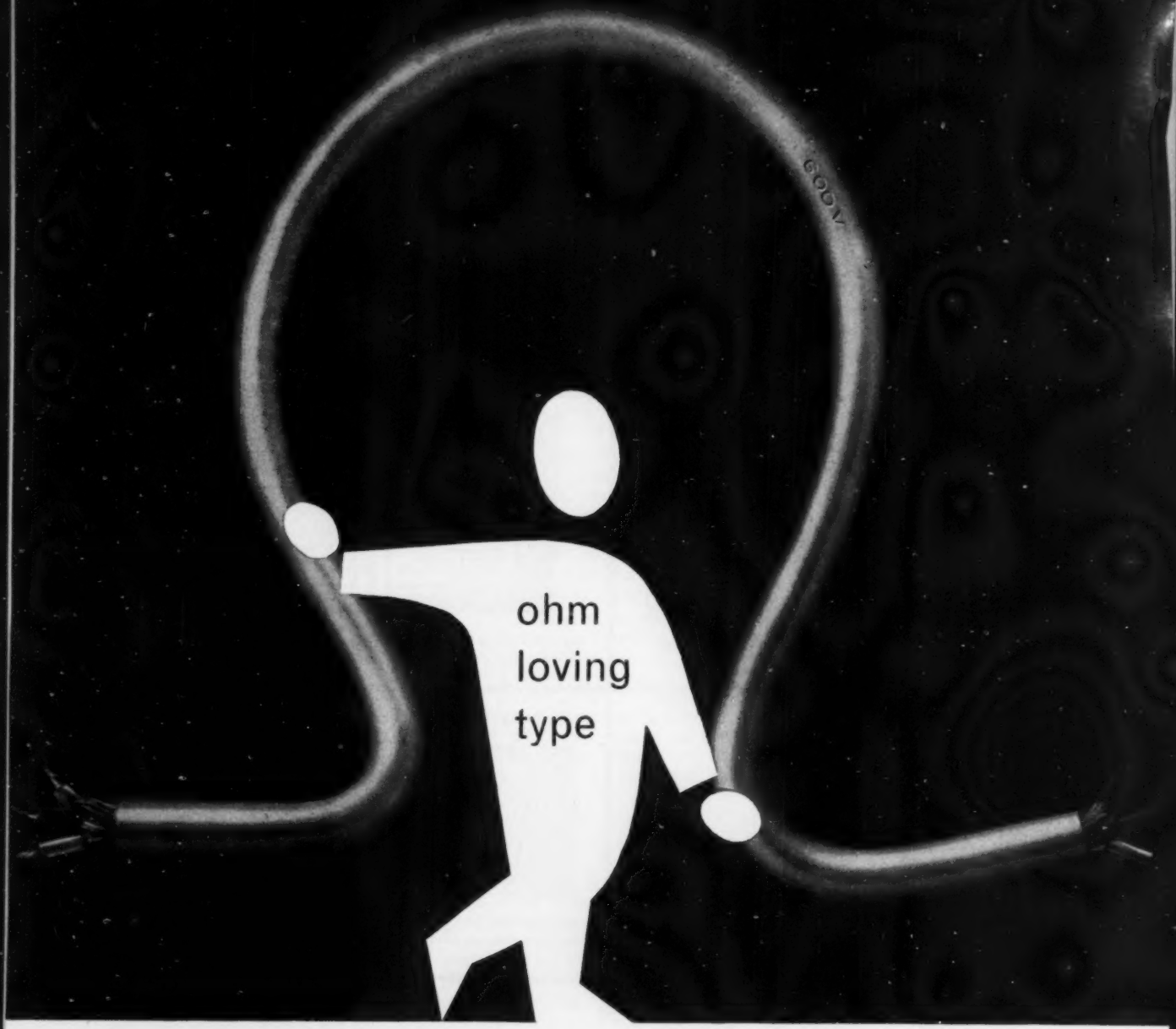

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TRADE MARK

SHELL-MADE RUBBER

MEN *and* MATTERS

A Review of People and Events

by Peter Richards

IT seems a far cry from the streamlined, brightly lit atmosphere of an exhibition like the Interplas international plastics exhibition (June 21-July 1 at Olympia) to Prince Albert's Great Exhibition of 1851. But there is a connexion. At the Great Exhibition, at a time when Charles Dickens was writing, and the car (and the tyre and the polymer industry) lay unsuspected over the horizon, the Gutta Percha Co. displayed thermoplastic products. The same company — metamorphosed into Telcon Plastics Ltd. — will be exhibiting at Interplas.

And Telcon in 1961 is as progressive as Gutta Percha was in 1851. The company will be showing a most interesting range of materials, from polypropylene sheet for vacuum forming to cellulose acetate butyrate and epoxy powders for dip coating.

Gilding the Moulding Powder

The machinery manufacturers at Interplas will have their usual enormous range of working exhibits; and as usual their stands will be surrounded by spectators watching the production of anything from buckets to ball-point pens. The fabricators will be showing a variety of precision products. But if you are a raw material manufacturer, what can you do to gild a bag of moulding powder?

The usual solution is to show finished products made from your company's materials, but some manufacturers are not content to leave it at that.

Distillers Plastics Group, for instance, are working on the principle that heat is never so hot as at an exhibition. This company is making sure that any customers at its stand will be cool customers by installing portable fans (moulded by the General Electric Co. in Rigidex hd polythene) which will blow fresh breezes from stategic points.

The leaven on US Industrial Chemical's stand will be the first European demonstration of a low-cost, fully automated system that forms and heat-seals packages from polythene roll-stock. In this demonstration the system will package copies of *The New York Times International Edition* in 1½mil. shrinkable film, at the rate of 30 a minute.

Monsanto's method of brightening up its materials display is a floral garden of 'eye-catching shapes'. But will they be as eye catching, I wonder, as the shapes on the Commercial Plastics stand, where mannequin parades will be held hourly during the exhibition.

Laporte Expert Men

A. E. C. Hatton has been appointed export sales manager of Laporte Chemicals Ltd.

Before joining Laporte last year, Mr Hatton spent some 14 years in the South African chemical industry.

L. D. Smith has been promoted to export sales office manager. Mr Smith has been active in the Junior Chamber of Commerce movement, both nationally and internationally, and he has just been nominated national secretary for the UK for the coming year.

These days exhibition staff may be in Berlin one week and Amsterdam the next. R. H. Windsor Ltd. is one of many polymer firms who exhibited at the recent trade fair in Moscow. Next week the firm is at the Interplas international plastics exhibition in London. My picture shows the new Windsor AP 30/115 machine injection moulding 31oz. disposable hd polythene bins in Moscow

BPF Works Managers at Southend

A considerable section of the plastics industry met in Southend recently when the British Plastics Federation works managers discussion group held a meeting.

Every leading plastics moulder in the country was represented and among the guest speakers was David Powell, chief industrial designer of Ekco Plastics Ltd.

To wind up the conference, David Radford, chairman of the BPF and director and general manager of Ekco Plastics, invited the delegates to visit the Ekco Plastics factory, where they saw the Ekco answer to some of the problems raised by the latest industrial techniques.

Foundation Stone

Fashion writers and buyers attended a reception at the Savoy Hotel, London, recently, to launch the first full range of foundation garments featuring Vyrene, the new man-made elastic yarn to be manufactured by Lastex Yarn and Lactron Thread Ltd.

D. H. Boulter, sales manager for Vyrene, gave a short account of the properties and uses of the yarn — a monofilament of the linear polyurethane type — and its effect on the textile industry as a whole. He was followed, I am told, by 'an attractive young dancer, who demonstrated the lightness, control and flexibility of the yarn, wearing a Schiaparelli bra and girdle'.

Comfort in Parliament

When the new Kaduna legislative assembly for the Northern Nigerian Parliament opens next September it will bear a marked family resemblance to the Houses of Parliament. For the winds of change have not prevailed against a number of European habits; one of which is our idea of seating comfort.

Whatever the constitutional departures that lie ahead, Nigerians will take comfort from the fact that in West Africa, as in Westminster, latex foam cushions are used to make

benches bearable. Heal's Contracts Ltd. are designing and making the seating, which is being upholstered with Vitafoam latex foam cushioning.

Sealing Off the Theatre

Rubber is helping to make Emergency Ward 10 even more efficient. The use of self-sealing gaskets moulded from a three-way blend of neoprene, Hypalon and SBR in a new hospital operating theatre makes

Installing a polystyrene foam wall panel in a rubber gasket in the construction of an operating theatre

for greater sterilization, since cracks and crevices are eliminated.

A new concept of design has been evolved by one firm for operating theatres; taking advantage of the wide range of modern engineering materials, the theatre can be fabricated in standard units independent of the main building fabric. Today's materials are more satisfactory from an anti-bacteriological point of view than the more traditional building materials.

Standard wall and ceiling panels of the structure, which is octagonal in plan, are made from a foamed polystyrene core faced with aluminium and coated with Hypalon synthetic rubber-based finish or other chemical resistant finishes. The panels are sealed to the framework and to each other by a system of corner trips and extruded gaskets coated with Hypalon. The three-way blend mouldings include the door seal (which also acts as a pressure seal), double window seals, roof seal and hatch seals.

No Quiet Retirement

Sir Brian Robertson, who recently resigned from the chairmanship of the British Transport Commission, has certainly not slipped quietly into retirement. Only a few days after his resignation he joined the board of Dunlop Rubber Co. Ltd. And a few days after that he was created a baron in the Queen's Birthday Honours List.

Sir Brian is no stranger to Dunlop. In 1933 — when he was 37 — he was Dunlop's managing director in South Africa.

Other Birthday Honours — page 900.

Appointments in Brief

Peter Dätwyler has been appointed managing director of Firestone's Swiss company — Fabrik Für Firestone Produkte AG. Robert Bült, who was managing director, has been made president of Firestone's new French company.

* * *

J. K. Dick has resigned from the board of British Xylonite Co.

Polly Ester Says...

'Break-through — finding someone on the stand who knows the answers'

THE LEGAL ANGLE

Picketing in Peace

By a Barrister

'Better training should be given to both sides entrusted with carrying out negotiating procedure in an industrial dispute. This point was stressed by the report on the recent unofficial strike at Dunlop's Speke works'.—RPW, May 6, 1961.

With strikes as with many other things, prevention is better than cure. But while we are still training people to settle their disputes peacefully, let us consider how far they can go, while still being peaceful, in furthering the objects or the success of strike action in a dispute. In other words: how far is peaceful picketing lawful?

After all, most of us agree that a man must be entitled to refuse to work if he sees fit. But is it lawful for him to parade up and down outside your premises, carrying banners, inducing others not to work? Can it be done *on* your premises, as opposed to outside them? What does the law do to make this picketing possible at all, when, otherwise, this blatant inducing of breaches of contract would clearly be unlawful?

The answer lies in Section 2 of the Trades Disputes Act, 1906. This says that 'It shall be lawful for one or more persons, acting on their own behalf or on behalf of a trade union, or of an individual employer or firm in contemplation or furtherance of a trade dispute, to attend at or near a house or place where a person resides or works or carries on business or happens to be, if they so attend merely for the purpose of peacefully obtaining or communicating information, or of peacefully persuading any person to work or to abstain from working'.

So peaceful picketing in furtherance of a trade dispute is lawful. And Section 5(3) of the Act defines trade dispute extremely widely — as 'Any dispute between employers and workmen, or between workmen and workmen, which is connected with the employment or non-employment, or the terms of employment, or with the conditions of labour, of any person'. And the expression 'workman' is defined as meaning 'all persons employed in a trade or industry, whether or not in the employment of the employer with whom a trade dispute arises'. So your clerks and secretaries are just as much 'workmen', for this purpose, as your drivers, operatives, machine hands and factory cleaners.

'Does this mean that picketing can actually be done on our premises?'

No. This is almost the only 'freedom' which the section does not give to a person who pickets in peace. If he actually comes on to your land, you may ask him to leave. If he refuses, he becomes a trespasser — and like any other trespasser, can be evicted by the use of 'reasonable force'.

To recover loss of face

498 THE ILLUSTRATED EXHIBITOR.
from the stock, by M. Lefaucheux, is a fine piece of workmanship. As the opinions of sportsmen are now generally in favour of loading at the breech, as well from its greater facility as its less liability to accidents, there can be little doubt that M. Lefaucheux's improvement upon this invention will be extensively
among others, a
an ebony stock;
silver mountings,
whether for real
to the guns. The
and silver mounting
the most remarkab
form. We must
PISTOL IN THE RENAISSANCE STYLE.—M. CAUTANI, PARIS.
REVOLVING PISTOL WITH SIX BARRELS.—M. LEFAUCHEUX, PARIS.
patronised. The REVOLVER PISTOLS, by the same maker, with four or six barrels, are formidable-looking instruments, of which some of us, perhaps, would care to try the power.
A FOWLING-PIECE, by M. Lepage Mantier, with an ebony stock, beautifully wrought, and chased silver mountings, is one of the finest things in the whole collection.
There is great variety in the articles exhibited by M. Devisme. We may mention,
PISTOL CARVED IN

Leave mere face-saving to those who think that excuses are equivalent to performance: here is something more spectacular:—How to recover *more* than face. Does your firm use its solvents only once, and then lose them?
Tell them how much they are losing. We can tell you how much they can *recover*—profitably. If they can't do it at a profit we'll tell you that.
Dazzle them with figures! Be The Man Who Suggested Solvent Recovery By Sutcliffe Speakman! Face, did we say? My dear Sir! We are offering you Reputation—nay—Prestige!

SUTCLIFFE SPEAKMAN

SUTCLIFFE, SPEAKMAN & CO LTD · Leigh · Lancs · Tel Leigh 72101 (5 lines) *London Office 2 Caxton St · Westminster · SW1 · Tel Abbey 3085*

VIEWS and REVIEWS

Mass Communication

EVERYTHING is big nowadays. From polymers to peoples, it is size and weight which seem to matter. To be large is a modern virtue and mass processes count. We no longer have morals but ethics, not conduct but statistical behaviour. Our sports are spectacles, our newspapers, insatiable for mass readership, devour each other. above all, we do not tell anyone, we advertise. Everything is in a mass.

To use our own jargon, advertising is a kind of cross-linking, the main intention of which is to bind a crowd of separate persons into a coherent unity, if not unit, whereby they will all rush swiftly in a named direction. We have had, and still have, in some modern states, a mass coherence which is frightening in its power, and, from them, we have learned that mass communications can corrupt good manners.

So we have come to suspect advertising; and so we offer sales resistance.

Perhaps nowhere in modern life is sales resistance so common and so devastating as in the relationships between employer and employed, between manager and managed. One of the methods adopted by 'the company' to cross-link its staff, to induce coherence (loyalty) is the house journal.

House Journals

There are, in fact, two main classes of mass-communication publications which are called house journals, but the two are quite distinct in aim and therefore in character.

The term 'house journal' should be restricted to the internal type, directed towards the firm's employees. The other one, aimed at the general public, might be better called a prestige or public relations journal, or even a sales promotion journal.

The distinction is discussed and its consequences observed, pursued, and analysed in a new book entitled 'Industrial Editing', by Bernard Smith, published by Pitman (under the auspices of the British Association of Industrial Editors) at 27s. 6d.

Chapter II, 'The Internal House Journal', begins: 'We live in a world of mass communications . . . because we live and work in a complex society, because there are so many of us, and because we are far more dependent on each other than we have ever been before'.

Making and Maintaining Contact

It then goes on to make the point that 'since it is impossible in modern industrial conditions for management to be in close personal touch with employees, or even for employees to be as closely linked with each other as they were in the past, the mass media communications which have been so strikingly developed during recent years must be used to ensure that contact is made and maintained. . . . Management must take an active and sustained interest in employee communications. It must ensure that its policies are explained to and understood by those charged with the communications programme, and that information about company activities reaches them fully and promptly'.

'Of all the mass media the house journal is the most versatile, the most effective and, in the long run, the most economical'.

The remainder of this interesting chapter deals with the subject matter of the internal house journal and especially its function of informing employees about the structure, organization, and current financial situation of the company.

Although he has a well-considered chapter on the external house journal, he would seem to believe that a 'house journal' is a term better restricted to the internal type, if one may judge from his last chapter, 'Industrial Editing in a Wider Context', which is concerned entirely and solely with internal company matters.

There are altogether in this book nine chapters and three appendices to them. It deals not only with the aims and objects of issuing house journals of all kinds but with the qualities needed in an editor, and also the practical questions of printing, design and layout, methods of distribution (shall we charge for it?), dealing with complaints, and so on.

Modern Trends in Plastics

One feature common to all external house journals is the excellence of presentation in paper, colour, design, layout, and generally in writing. A quarterly publication of I.C.I.'s Plastics Division which occasionally comes my way, is a case in point.

One issue of this publication — *Plastics Today* — carries five illustrated articles with kurzfassungen in Deutsch, resumenes en Espanol, resumes en Francais, riassunti in Italiano, sumarios em Portugues, and rezume na russkom yazki.

One of the articles is a shortened version of a paper called 'Modern Trends in Plastics' which was delivered by Dr J. Gadsby, the manager of the I.C.I. technical service and development department, as the opening lecture at the International Plastics Exhibition in Oslo in 1960.

Text, and graphs which you can see and tell their stories at once, describe the growth of the production of plastics in the last 15 years, and highlight outstanding facts such as the trend towards diversification in the chief plastics materials, notably with pvc and polythene. All in all, these factors lead to the conclusion that the economic trend is towards increasing tonnage and decreasing price.

There is an increasing trend, Dr Gadsby thinks, to achieve new technical effects by combinings in various ways, like copolymerizations, graft polymerizations, and blends of polymers (which the author boldly calls 'alloys', a term which used to be restricted to the mixing of metals or of a metal with a non-metal).

In the processing of plastics, Dr Gadsby draws attention to the increasing size of mouldings — and, hence of moulding machines — coupled with increasing simplicity of product design. Side by side with this trend to bigness with simplicity goes that towards integration of processes and to automation. Integration is on the large scale too; for example, the detergent manufacturer who now buys polythene granules and blows his own bottles.

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

The dominant technique for handling plastics is found to be extrusion and, no doubt, this will continue for some time. It is not limited to thermoplastics, and it can be used for compounding and colouring and for the polymerization stage of some materials, it is, indeed, a useful means, under some conditions, of generating free, reactive radicals.

Plastics are increasing so rapidly largely because, while generally possessing important resistive properties, they are eminently shapeable. Progress in the immediate future is likely to be considerably along the lines of combinations with other materials *e.g.* textile-plastics combinations, with paper and cardboard in packaging, fibre-reinforced plastics, etc.

Tetra Pak

The same issue of *Plastics Today* has an interesting story illustrating the combination of plastics and paper into a pack which is adding its quota to the revolution which polythene in its several forms is bringing about in the packaging field. The Tetra Pak is a Swedish invention, here called 'brilliant, revolutionary — and basically simple', for packing liquids. It is merely a paper tetrahedron sealed by means of a polythene coating on the inside.

A special paper, strong and long-fibred, is coated on one side with polythene, then printed on the opposite side, coated with wax and slit longitudinally into widths suitable for the packs. The terahedron is formed thus: the sheet is rolled into a tube shape and sealed down the length, then sealed across the base at right angles to the seam, and, finally, the open container is sealed across the top with a seal which goes at right angles to both the longitudinal seam and the seam at the base. This has been arranged into a continuous process.

The special polymer was developed by I.C.I. and enables the coating to be extruded through a slit die and drawn down to a thickness of 1½ thou. which is then hot-roll laminated to the paper.

The Tetra Pak is now in manufacture all over the world, production being of some 1,000m. per year. The package is strong, light in weight, easily handled and stored; the shape permits the economical use of hexagonal containers by means of which a given quantity of liquid can be stored in only half the space which would be required if pint bottles were used. Its up-to-the-minute advantage is that it lends itself readily to automatic vending machines.

Polypropylene

Another article in this issue of *Plastics Today* is concerned with the chemical and physical properties of Propathene, I.C.I.'s polypropylene.

The article outlines the possible stereo-structures of polypropylene and relates them and the molecular weight to some of the physical properties. The present Propathene range is of polymers of high isotactic content and high molecular weight.

Being a comparatively new commercial material, polypropylene has few firmly-established applications. Its high temperature resistance compared with polythene indicates possibilities in hospital and surgical work where sterilization is essential, for chemical processing, and in certain domestic appliances, though it is not as likely to replace polythene in household goods as it is to extend its range to include those in which greater rigidity and temperature resistance are wanted. There are tables of properties in this article and coloured illustrations of applications and of part of the Wilton plant.

Standardization in Packaging

Another external house journal is the *BSI News* which exists, presumably, both as a sales promoter in the broadest sense and as a public relations strengthener. The issue for March 1961 carries on pp. 9-11 an article on standardization in packaging.

Standardization does not mean uniformity or it could not be applied to packages the essence of which is often their distinctive character.

Whereas, before the war, there were only one or two British Standards which dealt with packaging, notably two for carboys and winchester bottles, today there are over 70, 'offering guidance on containers and equipment ranging from pill-boxes to carboys for acid, and from cheese-wraps to steel links and strap assemblies for lifting heavy cases. Among projects in hand is the drafting of recommendations about crates and cages for the carriage of live animals by air'.

'The vital need for guidance in this field was first felt during the war, when the "Packaging Code", BS 1133, was evolved to guide the Services and Government departments. It is not an exaggeration to say this was a revelation to some packers and manufacturers'. As one who had a small hand in it after the war, I can testify to its values to both makers and customers of packages, and particularly to the way in which it laid the foundations for a scientific or engineering approach to the problems of packaging.

'It is still widely used but its terms are broad'. The specialized standards of today are often dimensional ones, which have enabled the elimination of unnecessary variety in packs and even interchangeability. 'BS 1262, for instance, covering tins for paint and varnishes, has helped to reduce the number of sizes in use from some 800 to about 50'. Ready-mixed paint was sold by weight but now, thanks largely to BS 1262, it is sold by standard volumes, with the obvious resulting economies.

Other British Standards deal with quality. BS 1763, for example, applies to flexible, unsupported pvc sheet and lays down a variety of requirements including, thickness, tensile strength, dimensional stability, tear strength, adhesion of print, colour fastness, and degree of flammability, and specifies appropriate methods for measuring these properties. Other plastics materials are concerned in the BSI work going forward on plastics in packaging.

The newly published BS 3263 deals with vulcanized rubber closures for injectable products and seeks particularly to ensure that the closures form an effective barrier against micro-organisms after sterilization.

CHARLES JENNINGS

A monthly review of important papers on polymers published in the European technical press

European Technology Review

NEW ELASTOMETER — OZONE ATTACK — CHEMICAL ATTACK

By S. H. MORRELL and R. J. MOSELEY, Rubber and Plastics Research Association of Great Britain

A MACHINE of novel design is described by Kanavets and Batalova[1]: this may be used for testing either rubber or plastics, in tension, compression, or shear, using a variety of test pieces. A diagram of this versatile machine is shown below, and some guide to its dimensions may be derived from the drum (9) which is 25cms. wide.

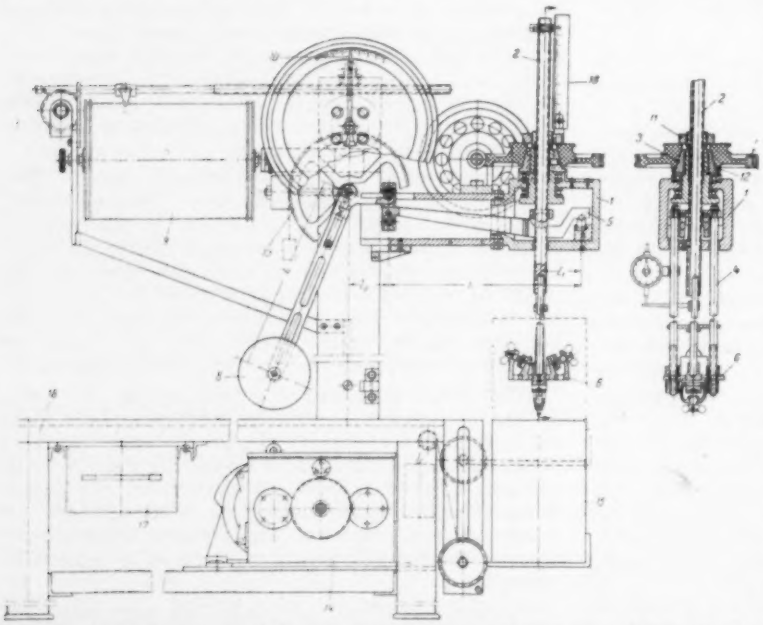
The specimen, here shown as a film, is mounted in the grip (6) and elongated by turning the gear wheel (7), which moves the spindle (2) in a vertical direction. The force required is balanced by means of the lever (5), which moves the dynamometer weight (8): this movement is transmitted to the scale (10) or the pointer on the drum (9). The drum is rotated by the same mechanism as the gear wheel (7), so that the pointer describes a stress-strain curve for the material. Tests at elevated or reduced temperatures or during immersion in various liquids may be made by raising the bath (15) to enclose the specimen, and the rate of deformation may be varied from one metre to one ten-thousandth of a metre per minute. A total force of up to three tons may be applied to the specimen.

Elastometer Tests

Interchangeable attachments for carrying out different tests are fitted to the ends of the guide rods (4). In this way, tensile tests may be made on dumb-bells, and the deformation in the case of rigid materials is measured by a micrometer gauge. Compression tests may be made, also indentation tests and the measurement of hardness by the indentation of a ball. Cross-breaking strength is measured in a similar manner. The apparatus may also be used to measure the elongation at break of a material over a range of temperatures, and hence to determine its low-temperature properties.

Another attachment which is described measures the elastic properties of materials in shear: it is also used to measure the properties of the intermediate layer in Triplex glass. Finally, this may also be used to measure bond strengths.

The authors stress that the load which acts on the specimen is not transmitted to the main frame of the apparatus, so that no error is introduced by its deformation.



Two sectional elevations of the new elastometer: 1, Main frame. 2, Spindle for deforming specimen. 3, Conical nut. 4, Guide rods. 5, Balance beam. 6, Specimen. 7, Gear wheel. 8, Pendulum with weight. 9, Recording drum. 10, Scale. 11, Nut. 12, Spring. 13, Gear wheel. 14, Reduction gear. 15, Thermostat bath. 16, Linear scale. 17, Instrument housing

Ozone Attack on Rubbers

How should we measure the attack of ozone on rubbers? Can a single number define adequately this complicated effect? These are some of the questions which Zuev and Pravednikova[2] seek to answer in their recent paper.

The authors measured the degree of cracking by the decrease of stress required to maintain a constant deformation. Assuming that the true modulus remained constant during the process, then this decrease was due to the effective area of cross-section decreasing as the number and size of the cracks increased. The results indicated that the time to the first appearance of the cracks, the rate of crack growth during the steady-rate period, and the time to complete destruction of the specimen, could all be represented by logarithmic functions of the ozone concentration.

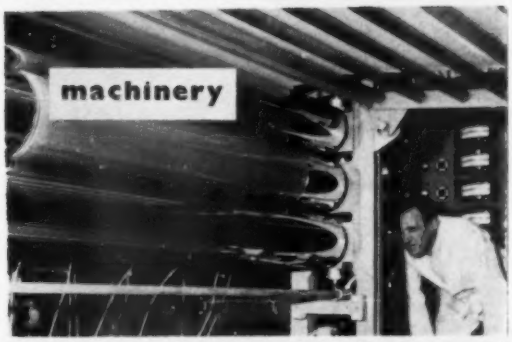
The rate of crack growth depended also on the deformation, passing through a maximum at a critical value of the deformation. The value of this maximum rate increased with the concentration, although the critical deformation itself was not altered.

The time to rupture also varied with the deformation, passing through a minimum at the critical value of the latter. Both the rate of growth and the time to rupture depended on the deformation in a manner which was independent of the ozone concentration, as could be shown by suitable manipulation of the co-ordinates.

The authors concluded that polymers react with ozone to form unstable ozonides which decomposed with rupture of the molecular chains, this decomposition being dependent on temperature. The formation of cracks, however, did not appear to depend on adsorption of ozone by the surface or on the diffusion of ozone through

Continued on page 989

Guide to INTERPLAS 61



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Top picture — ethylene purification unit at Esso, Fawley
Middle — extrusion at Telcon Plastics
Bottom — polycarbonate filter bowl by Spa Plastics

Read This First:

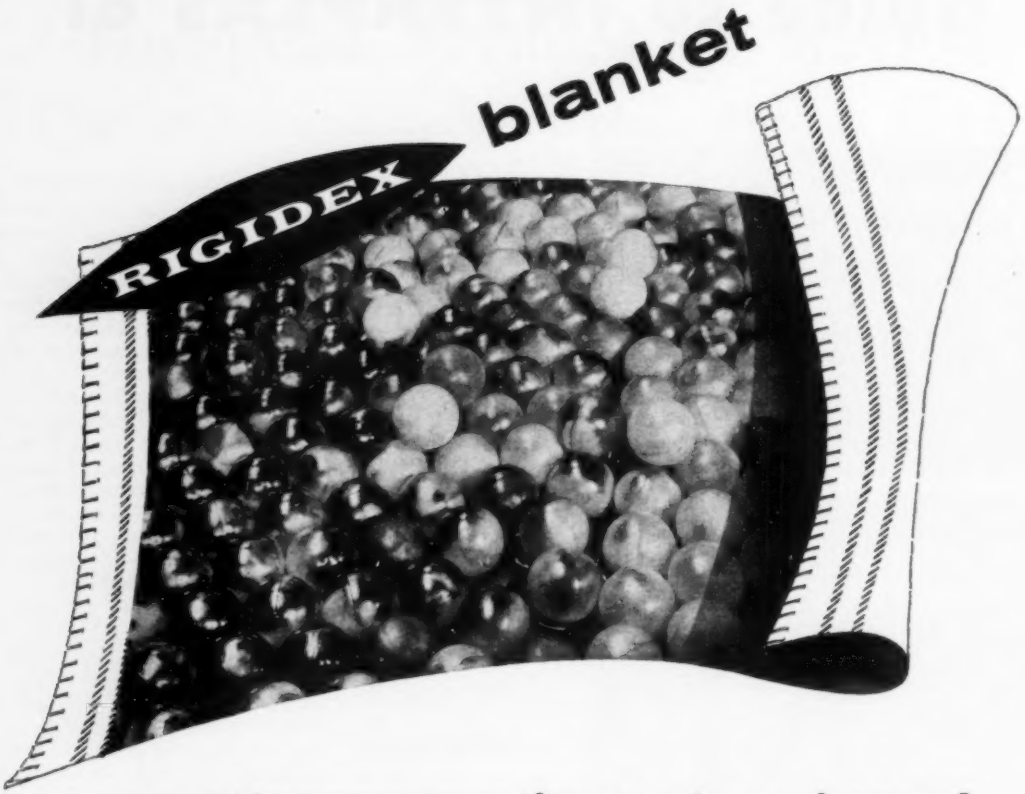
In order to provide a quick reference to the Interplas exhibition the following guide has been classified by methods of fabrication. This means that the visitor who is interested only in injection moulding, for example, will find all the exhibitors in this field, with stand numbers, in one section. An index to these sections is given above.

Each section consists of a general description of selected displays, followed by a table listing the exhibitors (and *principal* exhibits) in alphabetical order. This table is as complete as the available information at the time of going to press enabled us to make it.

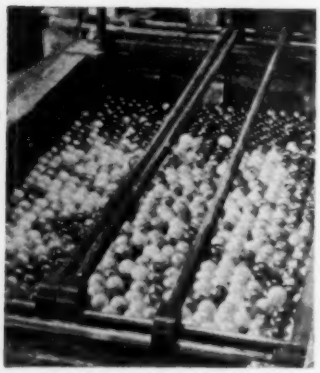
In most sections the exhibitors have been divided into raw materials, machinery and product manufacturers. Semi-finished materials, such as sheet, are generally classified under products.

Based on the experience of past exhibitions greater emphasis has been placed on the machinery side.

To make the best use of this guide, it is suggested that the visitor turns to the section he is interested in and marks the stand numbers, which he will find collected together, on the exhibition map in the catalogue. This will show him the 'quickest way round' from his own personal point of view.



puts corrosives to sleep!



Ball chroffles blow-moulded for W. Canning and Co. Ltd. by Lacrinoid Products Ltd.

Acids, alkalis, soda solutions in plating and pickling baths are now damped down by ball chroffles made from Rigidex, the new high density polyethylene. Light, rigid and buoyant, they minimise corrosive spray, reducing cleaning and maintenance on exhaust systems, busbars, jigs and protecting plating staff. Rigidex ball chroffles are suitable for temperatures up to 200°F and reduce surface heat loss by as much as 12%. Initial capital outlay is small, whilst long-term savings are considerable. Ball chroffles are one of many applications which highlight the effectiveness of Rigidex as today's leading corrosion resistant polyethylene.
For further information about Rigidex, please write for booklet No. 349

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Injection Moulding

MACHINERY

ALTHOUGH injection moulding is now such a well established technique, development of machines is continuous. There are perhaps no revolutionary processes which have appeared since the last Exhibition, but each method is now so much more advanced.

At one stage in the development of injection moulding machines the stress was on larger and larger equipment but now as much attention is devoted to small and medium sized machines. Preplasticization continues to encroach into the 'plunger' markets and the advent of attachments to one-stage plunger types to convert them into preplasticization types is important.

There are a number of working machines at the exhibition and numerous examples of what can be produced. Special attention is addressed to machines which present certain moulding problems including rigid pvc, hard acrylics and nylon.

The Larger Machines

For the first time the complete range of Peco machines is to be shown (PECO MACHINERY SALES (WESTMINSTER) LTD. Stand C63). The models to be exhibited include the 30 MR (shot 17-33.5in.^{3}; plasticizing capacity 100lb./hr.; mould locking force 150 tons and maximum opening stroke which is adjustable, 12in.); 35 MR; 40 MR; 50 MR and 60 MR (shot 159-330in.^{3}; plasticizing capacity 400lb./hr.; mould locking force 750 tons and maximum opening stroke, which is adjustable, 32in.). See Fig. 1.

All of the Peco machines include various novel features. The most characteristic is the single screw preplasticizing system where the screw is used for both the plasticization and injection of the melt. The important feature of this is the novel Peco Rotothrust system both for turning the screw and thrusting the ram (inside the screw) forward as the plunger. This combined drive unit has a special hydraulic ram to provide rotating and reciprocating motions. The patented system was developed by The Projectile and Engineering Co.

The screws and screw heads of the Peco machines are steplessly adjustable and are suitable for all commercially available thermoplastic materials. Three sizes of screw are available and the screw head isolates the shot to be injected, a non-return valve preventing leakage of material back past the head during injection which would cause sink marks (Figure 2). Other important features of these machines include the easy stepless adjustment of the shot weight; the two nozzles, one of which is an automatic shut-off type for low viscosity materials such as nylon and polythene; the vented hopper baseplate to allow escape of volatiles from the feed end of the screw and the fully balanced double toggle system for locking the mould.

THE LONDON AND SCANDINAVIAN METALLURGICAL CO. LTD. (Stand A323) will be demonstrating a Sommer DS Variant 10-2530 screw preplasticizing injection moulding machine. The machine can be fitted with a 1.37/64in. or 1.31/32in. diameter screw giving maximum shots of 3.0 cu. in. and 4.8 cu. in. respectively and average plasticizing capacities of 33 and 40lb./hour. The injection time for maximum stroke is 0.5sec. giving extremely fast cycles.

J. BROCKHOUSE AND CO. LTD. (Stand C17) will be demonstrating the well-known Brockhouse/Lester injection moulding machines. They will include two fully automatic types, the L150 — 4-6oz. machine incorporating the nylon cut-off attachment and the 12V circuit control and the L225 type 6-9oz. machine with redesigned injection unit retracting hydraulically and with a hydraulically operated nylon cut-off.

Vertical Injection

The Lester machines are unmistakable at any exhibition thanks to the valuable vertical injection system. This enables a heated spreader to be employed which gives double the heating area and more homogeneous plasticization. It also means that the high injection load of 55,200lb. is taken on the machine frame. The nylon cut-off system is claimed, with good reason, to provide the only foolproof, valveless arrangement for effectively controlling nozzle drool or freezing. The basic principle is very simple. After a nylon shot has been made, and before the mould opens, the cylinder moves up vertically, thus moving the flat nozzle out of register with the mould sprue bushing. This, of course, severs the sprue and prevents any leak.

Two new injection moulding machines will be exhibited by FOSTER YATES AND THOM LTD. (Stand C56). One of them is an interesting two unit machine where each unit may be operated quite independently. The first unit is a 400 ton high speed horizontal clamp with a direct hydraulic lock and the second unit is a 20oz. 'Foster-Wucher' screw type pre-plasticizing injection unit. Mechanical ejection is possible with an ejection bar, horizontal or vertical as desired. Although high speed there is a useful feature which gives 'slow-downs' so that the moulds may part at a reduced speed and the components can be ejected slowly to avoid damage. There is a patented piston check valve at the end of the screw which prevents back-flow of material along the tops of the screw flights. The machine can be used for such difficult materials as rigid pvc and hard acrylics.

Single Screw Plasticization

HAMILTON MACHINERY SALES LTD. (Stand C60) will be exhibiting the Ankerwerk V14-60; V20-140 and V25-200 and the Krauss-Maffei injection moulding machines. It is fitting that Ankerwerk, the firm that has been in the forefront of screw injection machine development and which built and delivered the first one, should be exhibiting at Interplas. The V14-60 has a plasticizing capacity of 44lb./hr. and the V25-200 a capacity of 123lb./hr. with shot sizes ranging from 1.83 cb. in. to 25.62 cb. in. The larger machines are made in conjunction with Krauss-Maffei but all have the single screw plasticization and injection technique. The machines do, of course, have all modern features and the screw plasticization gives a melt with very homogeneous properties. This allows the use of lower moulding pressures, faster cycles and the production of thinner walled objects.

BRADLEY AND TURTON (INJECTION) LTD. (Stand C18) are to exhibit their

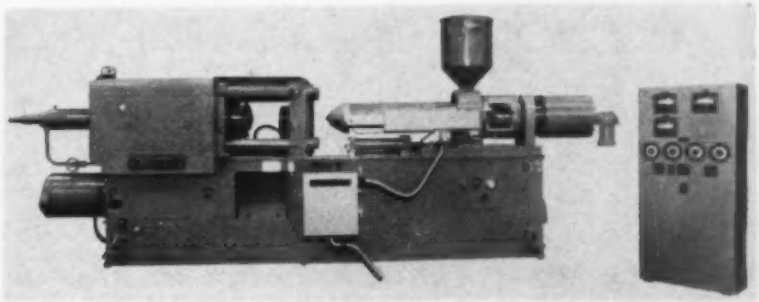

Fig. 1. Peco Rotothrust screw preplasticizing injection-moulding machine. Model 30MR

INJECTION MOULDING

new 3V-40 vertical injection machine with 300 ton lock and a shot capacity of 20oz.

INDUSTRIAL PLASTICS LTD. (Stand C83) will be showing the V175 Plastiniector injection moulding press with pre-plasticizer. This is a 7oz. (approx.) machine with a plasticizing capacity of 50lb./hr. (approx.).

BATTENFELD (ENGLAND) LTD. (Stand C44) will be exhibiting Battenfeld Maschinen-fabriken GmbH injection moulding machinery. DIMON (ENGLAND) LTD. (Stand A306) will be demonstrating the Fimsai model 4/700 injection moulding machine, moulding rigid pvc.

R. H. WINDSOR LTD. (Stand C39) will be showing three new injection moulding machines and an improved model of their well-known AP 200. The latter is a large capacity machine (124oz. polystyrene) with a plasticizing capacity of 350lb./hr. The new machines are the SP7 (4oz.), the SP 30 (18.6oz.) and the AP30/115 (71oz.). The SP7 is a single screw preplasticizer type capable of working all thermoplastics, although in some instances (such as rigid pvc) an alternative head and screw is available. The machine, which will be working, can be fully or semi-automatic. The AP30/115 has the well-known Windsor twin screw Autoplas design as the preplasticizer unit and is constructed for hand or semi-automatic control.

BUHLER BROTHERS (Stand C85) will be exhibiting a new range of machines in Britain for the first time, including the Rover 175 and the Rover 350 screw type injection moulding machines.

ALFRED HERBERT LTD. (Stand A326) will be exhibiting new and improved versions of some well-known machines. These include the Herbert 2630 Type S 20oz. machine and the Herbert Reed-Prentice 175T Type S 10oz. machine, both self-contained screw-type injection machines. Each machine is fitted with water cooling for the dies, barrel-mounting, injection screw and hydraulic oil circuit. Operation is by hand, semi or fully automatic. All the Type S machines are screw plasticized and the screw unit incorporates a non-return valve to maintain processing during injection.

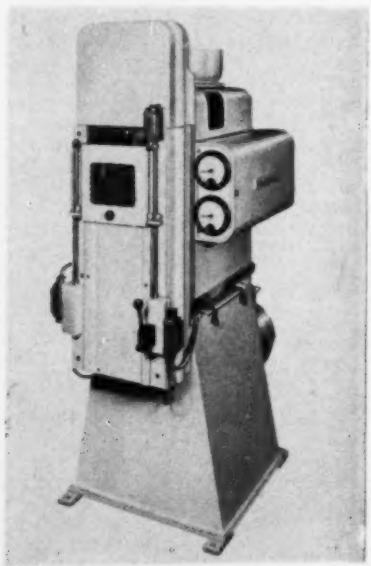

Fig. 3. Hupfield ⅛oz.-capacity vertical injection-moulding machine

The Smaller Machines

Any division between small and large machines must obviously be arbitrary. Many firms manufacture sizes from a few oz. capacity to the largest. Some however, normally specialize on smaller machines which is the type included in this section.

Small injection moulding machines have a definite place in industry. They are not just for the small firm who cannot afford the admittedly expensive large modern automatic machines. In the larger concerns they are used for making large quantities of tiny objects, for short production runs or for experimental purposes.

HUPFIELD (HUPFIELD MACHINERY SALES LTD.) (Stand C100) have been well known in this field for many years. They will be exhibiting five machines ranging in capacity from ⅛oz. through 1¼oz. and 2½oz. up to 4oz. There are two ⅛oz. machines, one with a vertical and another with a horizontal lock. Both machines have the same performance with a plasticizing capacity of 15lb./hr. with a 15sec. cycle (dry run speed 3½sec.) which is automatically controlled. Figure 3. The 1¼oz. and 2½oz. machines are very similar and may be hand, semi-automatic or fully automatic. In both cases there is a self-compensating auto feed, the cylinder containing a special spreader to ensure maximum heat transference and a very high plasticizing rate (40lb./hr. for 2½oz. machine).

The Hupfield 4oz. machine is remarkable for its size. It has a preplasticizing cylinder as well as an injection cylinder, the two being connected by a heated vertical tube fitted with a non-return valve. The nozzle incorporates a shut-off valve and special nozzles for single impression sprueless moulds can be provided if required. The maximum plasticizing capacity with a 1oz. shot is 73lb./hr. and the speed of a 1oz. injection shot is 0.44sec.

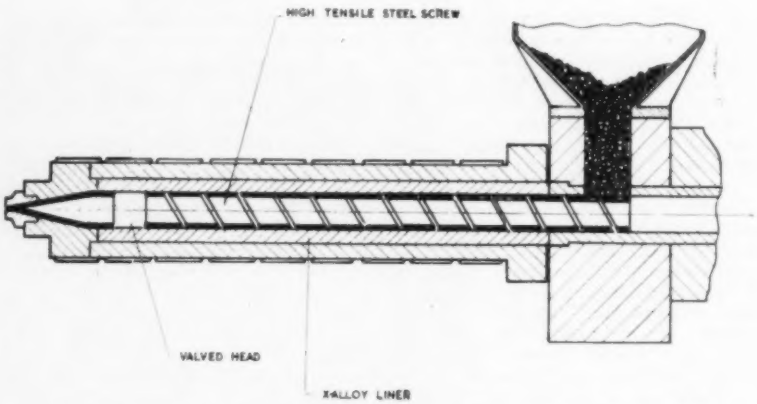

Fig. 2. Plasticizing unit of the Peco Rotothrust, showing valved head and multiband heaters

DOWDING AND DOLL LTD. (Stand A331) will be exhibiting four entirely new injection moulding machines. These are the Dowding Universal Injection Moulding Machine, a new 'in-line' type of 2oz. capacity; the 'Kensington Automatic', a new 20gm. machine; the 'Kensington Power Lock', a simplified 20gm. machine and the 'Progressive Mercury', a 1oz. insert moulding machine, an American product for which Dowding and Doll have secured sole UK representation.

The Dowding 'Universal' is capable of fast automatic production with a wide range of thermoplastics. There is an injection screw readily removable for cleaning. In addition the movement of a lever releases the platen when the nozzle can be reached for easy removal, which also applies to the mould (Figure 4). The Kensington Automatic is efficient but eliminates all unnecessary refinements. However, either single or double stroking can be selected enabling preplasticization to be carried out during the cooling period of the previous shot. The heating cylinder is of the plunger type and the machine can be set for automatic cycle, single cycle or inching. The 'Kensington Power Lock' machine is similar but mould opening and closing is effected by means of a hand lever, locking and injection being hydraulically operated.

From Milan

BAKER PERKINS GRANBULL LTD. (Stand C45) will display their fast Hydroplas injection moulding machine. It has a shot capacity of 5½oz. (polystyrene), a 120 ton locking force, and an output of four shots per min. They are also exhibiting the Plastmatic 300/40/150 from Triulzi of Milan, an in-line screw preplasticizer with a 10oz.

INJECTION MOULDING

shot. FRANCIS SHAW AND CO. LTD. (Stand C62) will exhibit their ¼oz. machine and the CHURCHILL INSTRUMENT CO. LTD. (Stand C96) their Churchill ¾oz. high speed fully automatic machine capable of speeds up to 1,600 shots per hour. THE ELGAR MACHINE TOOL CO. LTD. (Stand C61) will be showing their 'Flesch' 4/6oz. vertical and horizontal machine. It is fitted with a new screw and plunger preplasticizing system. NEGRI BOSSI EVANS LTD. (Stand A316) will be exhibiting six automatic injection moulding machines. Three of these, the V3 FA (1.1oz. shot; 39.6lb./hr. plasticizing), the NB 100 V (3.8oz. shot; 70.5lb./hr. plasticizing) and the NB 200 V (7.6oz. shot; 99.2lb./hr. plasticizing) have screw-preplasticization and the three others, the R3 FA (1¼oz. shot; 12lb./hr. plasticizing), the R5/FA (1.6oz. shot; 30.8lb./hr. plasticizing) and the R6/FA (3oz. shot; 30lb./hr. plasticizing) are all fully automatic and capable of being modified to increase or reduce size as required.

THE SMALL POWER MACHINE CO. LTD. (Stand A339) are to exhibit their interesting and inexpensive small machines. The SP Plastic Injection machine, hand operated bench model, has the moulds held by a quick release vice; it moulds up to 180 articles per hour; has a capacity of ¾oz. and a pressure of 5,000psi and costs only £52 10s. A power operated SP model (¾oz.) is also available, operated pneumatically or hydraulically, the cost of the vertical bench model being £98. The Arburg injection moulding machine will be exhibited by ENGIS LTD. (Stand C52). This small machine, with a shot capacity of 6-8gm. and a rate of up to 400 shots per hour, can be hand operated or semi-automatic. The machine has many of the refinements of its larger cousins including a dosage unit with self operating quantity compensator, a correct cylinder for every material which can be quickly changed, pressure regulator, automatic timing of injection pressure, waiting time, opening and closing time of mould etc.

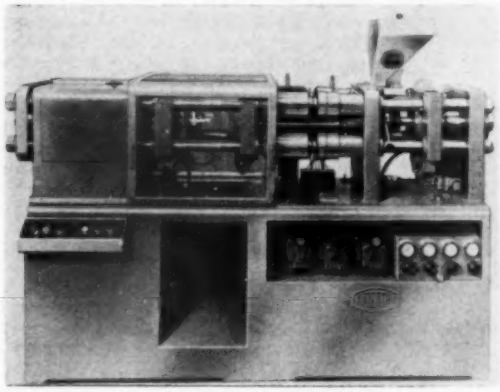

Fig. 4. Dowding Universal injection-moulding machine

Alfred Herbert Ltd. will also be exhibiting some small machines. The Edgwick 1214-HY Type S injection moulding machine has a 3oz. capacity and has the usual valuable features. These include a quick-acting clamping device fitted to the fixed dieplate which can be advanced slightly at each opening stroke in order to give automatic sprue break. The forerunner of this machine, the Edgwick Type 1214-HY machine, with plunger type injection cylinder and 1½oz. (cellulose acetate) capacity will also be on show. A double shot mechanism, which increases the capacity of the machine by double packing, is fitted.

Speciality Machines and Auxiliary Equipment

FOSTER YATES AND THOM LTD. (also exhibiting a two-unit machine on Stand C56) are demonstrating a rotary type hydraulic forcing machine with ten mould stations. This is the 'DESMA 606 Bootee Machine' with a Foster-Wucher W700 injection unit capable of producing bootees or small wellington boots at a high rate. New features include three part mould carriers with hinged cores to carry a last and a means for splitting the last as the mould carrier opens. Proven rates include 70 pairs per hour for large sizes and 120 pairs per hour for small sizes. TURNER MACHINERY LTD. (Stand C13) are exhibiting their well-known Turnamatic and Rotamatic machines giving a high rate of production

Those who do not wish to buy an expensive injection moulding press without first having tried them out on a production scale, may wish to purchase a unit to fit to a compression press to convert it to an injection press. BRADLEY AND TURTON (INJECTION) LTD. (Stand C18) will be exhibiting their 64oz. conversion injection unit for fitting to existing down-stroking compression presses. The unit incorporates a screw preplasticizer with 'up-shooting' plunger injection. Another comparatively inexpensive conversion can be made with the BONE BROTHERS LTD. (Stand C91) 2½in. screw preplasticizing unit suitable for fitting to all makes of injection moulding machines.

ETHER LTD. (Stand C86) will be exhibiting their 'Transitrol' temperature controllers, recorders and all temperature measuring equipment. THE CHURCHILL INSTRUMENT CO. LTD. will also exhibit their temperature controller,, noted for its small dimensions. MEECH ELECTRIC DRIVES (LONDON) (Stand C110) will exhibit all types of anti-static equipment.

PRODUCTS and MATERIALS

THE refrigeration industry is a large user of injection moulded components and the exhibition contains many examples of liners, name inserts and other components. EKCO PLASTICS is one of the main manufacturers in this field, and its display includes a series of injection moulded liners up to 5 cu. ft. capacity — the largest liner yet produced by the process in the UK. (Figure 5.) Another large Ekco moulding displayed is a lattice grid measuring 3 sq. ft. Called the Polygrid, this is produced for Head Wrightson processes for use in water cooling towers at power stations.

Industrial injection mouldings with the emphasis on precision and quality will be found on many stands. A good example is that of SPA PLASTICS, where the items include graphitized polystyrene gears (Figure 6), nylon cable clamps and a filter bowl moulded in styrene acrylonitrile or polycarbonate. The latter, a component for com-

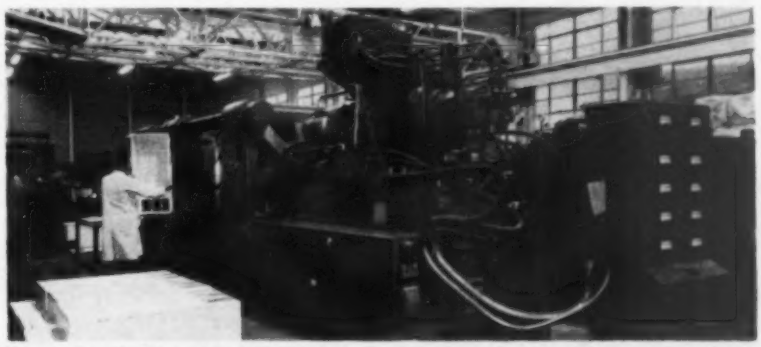

Figure 5. Refrigerator liners of 5 cu. ft. capacity being produced at Ekco Plastics Ltd's Southend factory

INJECTION MOULDING

pressed air equipment, is completely free from any strain and withstands a constant internal pressure of 1,600psi. Until recently this type of component was manufactured successfully only in the USA, and is an excellent example of British craftsmanship.

Polystyrene containers, fitted with hinged and push-on crystal clear lids, usually designed to display something — are themselves the feature of a display at the PLASTIC BOX CO. LTD.'s stand. Plastic Box specializes in carrying a large stock of styrene containers. Over 100 designs are carried, so that customers can buy small quantities without paying mould charges, or waiting for mould making.

More and more firms who have become household names in connexion with conventional materials, such as the big steel and electric companies, are starting plastics divisions of their own. One of the best established of these is

Figure 6. Graphitized polystyrene gear and a nylon pinion, injection moulded for a film slide projector by Spa Plastics

GEORGE GOODMAN LTD., the plastics offshoot of the Guest Keen and Nettlefolds steel giant. Goodman is showing examples of its exclusive GG Mini-Moulding production technique. This employs single impression tools working at high speed, thus lending itself to the production of intricate engineering components in thermoplastics, with a special emphasis on nylon.

Comprehensive ranges of injection grades of thermoplastics are being shown by the raw materials manufacturers, such as I.C.I., SHELL, DISTILLERS and MONSANTO, and details are given in the table in this section. Since there is little aesthetic interest in a bag of moulding powder, most firms here, as always, are showing fine examples of finished products. ERINOID LTD., a member of the Kleemann group — who, if a recent takeover bid goes through will become the entry into the UK plastics field for the US oil giant Socony Mobil — is showing a wide range of industrial and injection mouldings, including a complete injection shot for heavy-duty screwdrivers in cellulose acetate.

LIST OF EXHIBITORS — INJECTION MOULDING

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

ANCHOR CHEMICAL CO. LTD. Clayton, Manchester, 11.	**CC 421**	**Borg Warner Cycolac Brand ABS Polymers.** A tough, hard, rigid and light-weight resin specially suited for the manufacture of any product requiring good impact strength even at low temperatures.
BRITISH CELANESE LTD. Celanese House, Hanover Square, W.1.	**B 215**	**Dexel acetate moulding and extrusion powder and Forticel cellulose propionate moulding powder.** This is becoming very popular for transistor radio cases.
BX PLASTICS LTD. Higham Station Avenue, Chingford, E.4.	**B 224**	**Bextrene and Akulon moulding powders.** A range of moulding powders of polystyrene and nylon.
CORNELIUS CHEMICAL CO. LTD. Ibex House, Minories, E.C.3.	**BB 513**	**Plexigum acrylic moulding powders.**
P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	**B 204**	**Pvc compounds.**
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	**B 216**	**Styron closures for packaging.** Disposable beakers for automatic vending of hot drinks will also be displayed.
DOHM LTD. 167 Victoria Street, S.W.1.	**A 305**	**Reprocessed polythene.** Injection-moulding grade in a wide colour range.
DU PONT CO. (UK) LTD. 76 Jermyn Street, S.W.1.	**C 74**	**Range of mouldings in Butacite, Lucite, Alathon, Zytel, Delrin and Teflon.** A large number of industries including cars, cables and radio are represented.
ERINOID LTD. West Halkin House, West Halkin Street, Belgrave Square, S.W.1.	**B 208**	**Erinoid polystyrene, high-density polythene, cellulose acetate and petrothene polythene.**
FARBWERKE HOECHST AG. Frankfurt Main, Western Germany. UK Representatives: Hoechst Chemicals Ltd. 50 Jermyn Street, S.W.1.	**B 219**	**Hostalen G high-density polythene. Hostalen PP polypropylene. Hostaflon C2 ptfce.** The new Hostalen GB series has good flow properties, high surface finish, and freedom from distortion. Hostaflon is a fluorinated polymer suitable for injection moulding.
FOSFATBOLAGET (STOCKHOLMS SUPERFOSFAT FABRIKS AB) Cardellgatan 1, Stockholm 5, Sweden.	**BB 507**	**Pevikon polyvinyl chloride resins.**
IMPERIAL CHEMICAL INDUSTRIES LTD. Plastics Division, Millbank, S.W.1.	**C 66**	**Range of mouldings made from Alkathene and Propathene.** Exhibits include one of the first cisterns moulded in Propathene.
KINGSLEY AND KEITH (CHEMICALS) LTD. Rex House, 38 King William Street, E.C.4.	**CC 405**	**Moulding materials, stabilizers and organic pigments.** Low-molecular-weight AC polythene, nylon, Advastals range of pvc stabilizers, and Harmon pigments.

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CHARLES LENNIG AND CO. (GREAT BRITAIN) LTD. 26-28 Bedford Row, W.C.1.	BB 547	**Oroglas acrylic moulding powders.** Oroglas TA is an acrylic moulding powder modified for impact strength.
M & B PLASTICS LTD. Dagenham, Essex.	B 207	**Technyl polyamides.** Now available in a wide range of types.
MONSANTO CHEMICALS LTD. 10-18 Victoria Street, S.W.1.	C 34	**Lustrex polystyrene — G.P. T3, T7, T11, UVL T6 — low static.** High-softening grades: GP/HS, T3/HS, T7/HS.
PECHINEY-SAINT GOBAIN Agents: K.W. Chemicals Ltd. Caroline House, 55-57 High Holborn, W.C.1.	BB 534	**Polystyrene and polythene moulding materials.** Pvc compounds and vinyl compounds.
PLASTTRADING LTD. Verenigd Plastic-Verkoopkantoor N.V., Zeist, Holland.	C 80	**Akulon-nylon** and Stamylan-polythene granules for injection moulding.
SHELL CHEMICAL CO. LTD. Old Burlington Street, W.1.	B 218	**Comprehensive range of raw materials for injection moulding.** Carlona P. polypropylene. Carlona polythenes, and pvc. Carinex polystyrenes and styrene/acrylonitrile copolymers.
SIC PLASTICS LTD. 12 Whitehall, S.W.1.	C 23	**ABS Terpolymer Sicoflex.** This is a new, tough, moulding powder, having good impact strength and resistance to oils.
STERLING MOULDING MATERIALS LTD. Sterling House, Heddon Street, W.1.	B 223	**Pvc compounds; toughened polystyrene copolymers.** ST.80 medium-impact and ST.122 high-impact grades have been added to the Sternite polystyrene range.
JOHN AND E. STURGE LTD. Wheeleys Road, Birmingham, 15.	BB 518	**Calofort S,** a high-quality filler in pvc injection-moulding compounds giving a good surface finish with high gloss and high resistance to scratching and marring.
US INDUSTRIAL CHEMICALS CO. INTERNATIONAL P.O. Box 10, Kirchenstrasse 13, Zug 1, Switzerland.	B 209	**Containers, housewares, etc., injection moulded in Petrothene polythene.**
VINATEX LTD. Carshalton, Surrey.	B 217	**Wide range of mouldings made from Vinatex vinyl compounds.**

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BAKER PERKINS GRANBULL LTD. 39 High Street, Kingston upon Thames, Surrey.	C 45	**Triulzi Preplastmatic 300/40/150 and Hydroplast 140.** British-built machinery based on triulzi design.
BATTENFELD MASCHINENFABRIKEN GmbH. Agents: Battenfeld (England) Ltd. Great South-West Road, Bedfont, Feltham, Middx.	C 44	**BSM preplasticizing machine.** BSM 40V vertical injection moulder.
BEANWY ELECTRIC LTD. Rushey Lane, Tyseley, Birmingham, 11.	C 87	**Induction heaters for injection-moulding machines.** A working exhibit will show the effects of induction heating on temperature control.
BIP ENGINEERING LTD. Streetly Works, Aldridge Road, Sutton Coldfield, War.	C 55	**Bipel 4/6oz. injection machine.** Bipel 150-ton down-stroking press together with horizontal 8oz. injection attachment.
BIP TOOLS LTD. 147 Tyburn Road, Erdington, Birmingham, 24.	C 42	**Variety of complete moulds, including injection.** Mould parts to show services given to small mouldmaker.
BONE BROTHERS LTD. Manor Farm Road, Alperton, Wembley, Middx.	C 91	**A 2½in. screw pre-plasticizing unit suitable for fitting to all makes of injection-moulding machines.** On show for the first time.
BRADLEY AND TURTON (INJECTION) LTD. Caldwall Works, Kidderminster, Worcs.	C 18	**No. 3V-40 vertical injection-moulding machine, and 64oz. conversion injection unit.** New unit for fitting to existing downstroking compression presses so that they can be converted for injection moulding.
J. BROCKHOUSE AND CO. LTD. 25 Hanover Square, W.1.	C 17	**Brockhouse/Lester injection-moulding machines.** Fully-automatic type L.150-4/6oz. machine incorporating nylon cut-off attachment and 12V. circuit control.
BUHLER BROTHERS Uzeil, Switzerland.	C 85	**Rover 175 and Rover 350 screw-type injection-moulding machines.** These will be exhibited in England for the first time.

INJECTION MOULDING

CHURCHILL INSTRUMENT CO. LTD. Walmgate Road, Perivale, Greenford, Middx.	C 96	**Churchill ¾oz. high-speed fully-automatic injection-moulding machine. Churchill mould temperature controller.** Injection moulder is new introduction, capable of speeds up to 1,600 shots per hour. Temperature controller: very small dimensions, accurate mould-temperature control, very rapid mould heating.
CRAVENS LTD. Darnall, Sheffield, 9.	A 327	**HPM range of hydraulic injection-moulding machines.** Two models exhibited — one preplasticizer and one conventional — each with long stroke and daylight.
DIMON (ENGLAND) LTD. 181a Bath Road, Slough, Bucks.	A 306	**F.I.M.S.A.I. screw preplasticizer injection-moulding machine, 13oz.** Model 4/700 moulding rigid pvc.
DOWDING AND DOLL LTD. 346 Kensington High Street, W.14.	A 331	**Dowding universal injection-moulding machine, Kensington Automatic, Kensington Power Lock, and Progressive Mercury.** All machines will be on display for the first time.
ELGAR MACHINE TOOL CO. LTD. 172-178 Victoria Road, Acton, W.3.	C 61	**Flesch 4/6oz. vertical and horizontal machines.** The Flesch vertical machine is fitted with a screw and plunger preplasticizing system and is exhibited for the first time in the U.K.
ENGIS LTD. Gabriel's Hill, Maidstone, Kent.	C 52	**Arburg injection-moulding machine.**
ETHER LTD. Tyburn Road, Erdington, Birmingham, 24.	C 86	**Control instruments.** Transitrol temperature controllers, recorders and all temperature-measuring instruments for plastics machines.
FELBER JUCKER AND CO. LTD. Brook House, 48 Upper Thames Street, E.C.4.	A 336	**Rotojet and Gomat injection-moulding machines.** French machines by Laroche Fréres and Claude Ganthier.
FELBER JUCKER AND CO. LTD. Brook House, 48 Upper Thames Street, E.C.4.	A 320	**Engel Esma-SCH 500-1,000 injection-moulding machine.** Fully automatic, with screw preplasticizer.
GUYSON INDUSTRIAL EQUIPMENT LTD. North Avenue, Otley, Yorks.	A 325	**Deflashing equipment and matt-finishing equipment.** SBP/40 for individual treatment of mouldings. T/40 Guyrota for removal of flash from large quantities of small mouldings.
HAMILTON MACHINERY SALES LTD. 32 Buckingham Palace Road, S.W.1.	C 60	**Ankerwerk V14-60, V20-140, V25-200, and Krauss-Maffei V42-550 injection-moulding machines.** Single-screw preplasticizers.
ALFRED HERBERT LTD. P.O. Box 30, Edgwick Works, Coventry, War.	A 326	**Edgwick Herbert and Herbert Reed-Prentice injection-moulding machines and equipment.** Single-screw plasticizing and injection units and plunger-type machines.
HUPFIELD MACHINERY SALES LTD. (Hupfield Bros. Ltd.) Welton Manor, near Daventry, Northants.	C 100	**The Hupfield range of injection-moulding machinery ¾oz. to 4oz. capacity.** Displayed for the first time will be the ¾oz. horizontal lock fully-automatic model.
INDUSTRIAL PLASTICS LTD. 93 Regent Street, W.1.	C 83	**GBF plastiniector and plastiform.**
LONDON AND SCANDINAVIAN METALLURGICAL CO. LTD. Wellington Works, Wellington Road, S.W.19.	A 323	**Screw preplasticizing injection machine.** A Sommer screw preplasticizing DS variant 10-2530 will be demonstrated, showing the extremely fast cycles obtainable with this machine.
MARKMASTER (TRADING) LTD. 39 Victoria Street, S.W.1.	C 49	**Markmaster dry-colour marking, blocking and hot-stamping machines.** The Major, the largest standard machine of its kind in the world, and the unique, and completely automatic, electronically-operated tube measuring and marking machine will be exhibited for the first time.
MARTIN SUPPLY CO. (WESTCLIFF) LTD. 57 West Road, Westcliff-on-Sea, Essex.	CC 402	**Photographic details of Netstal Rotomat.** This firm claims to be the only company in this country with a Netstal Rotomat of a size and type capable of producing mouldings from 4-32oz. in practically all known injection materials.
MEECH ELECTRIC DRIVES (LONDON) LTD. 150 Clapham Manor Street, S.W.4.	C 110	**A complete service for static elimination.**
PECO MACHINERY SALES (WESTMINSTER) LTD. 28 Victoria Street, S.W.1.	C 63	**Rotothrust range of screw preplasticizing injection-moulding machines — 21MR, 30MR, 35MR, 40MR, 50MR and 60MR.** A completely new range of screw preplasticizing machines from 2-178oz.
PERRY, G., AND SONS LTD. Hall Lane, Aylestone, Leics.	C 16	**Machined aluminium and kirksite moulds.** Pattern-making services available.

INJECTION MOULDING

FRANCIS SHAW AND CO. LTD. Corbett Street, Ashton New Road, Manchester, 11.	C 62	**½oz. injection-moulding machine.**
THE SMALL POWER MACHINE CO. LTD. 4 Sunleigh Parade, Ealing Road, Alperton, Wembley, Middx.	A 339	**SP bench injection-moulding machines, hand and power operated.** Useful for short runs and sampling.
TURNER MACHINERY LTD. Bramley, Leeds, 13.	C 13	**Turnamatic and Rotomatic injection-moulding machines.**
VOLANT BROS. 7 Greenland Place, N.W.1.	A 304	**The VB range of injection-moulding machines.** The latest machines will hold larger and deeper moulds.
R. H. WINDSOR LTD. Leatherhead Road, Chessington, Surrey.	C 39	**New injection-moulding machines:** SP7, SP30, AP30/115, AP200. AP200, an improved model, will also be shown.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

AEROPLASTICS LTD. 1-7 Carlyle Avenue, Hillington, Glasgow, S.W.2.	C 27	**Refrigerator interior designed to incorporate thin walls.** Pvc and polypropylene pipe fittings.
ASSOCIATED ELECTRICAL INDUSTRIES LTD. Crown House, Aldwych, W.C.2.	CC 415	**Range of injection mouldings.** Telephone mouldings, domestic appliance parts and electrical components.
BARCLAY STUART (PLASTICS) LTD. 25-27 Brunswick Street, Luton, Beds.	C 106	**Industrial mouldings, radio control knobs.** Household articles.
BIRKBYS LTD. Liversedge, Yorks.	B 222	**High-grade technical injection mouldings in most materials.** New injection-moulding department recently been extended; covers comprehensively from fractions of an ounce to 72oz. capacity.
CASCELLOID (DIVISION OF BRITISH XYLONITE CO. LTD.) Abbey Lane, Leicester.	C 65	**Moulded components for the electrical and electronic industries, moulded deep trays for assembly-conveyors, yarn cones for spinning mills, suit-case handles, letters and figures for number-plates.** Suit-case handles, while made to customer's design, are as used on suit-cases made by Cascelloid.
COLORTYPE (LONDON) LTD. Poughill, Bude, North Cornwall.	C 11	**Colortype display lettering — injection moulded.** Being used extensively for display purposes, public buildings and signs.
DURAPIPE AND FITTINGS LTD. Winnock Road, West Drayton, Middx.	C 27a	**Thermoplastic fittings.** These are made plain for solvent welding, or screwed with the threads moulded-in during manufacture.
EKCO PLASTICS LTD. Ekco Works, Southend-on-Sea, Essex.	C 67	**Mouldings for a wide variety of industries. Also Ekco Gold Seal domestic ware.** Largest injection-moulded refrigerator liner — 5cu.ft. model — for Frigidaire. Also Supersink, sink/drainer unit in polypropylene recently introduced.
GEORGE GOODMAN LTD. Robin Hood Lane, Hall Green, Birmingham, 28.	C 109	**GG MiniMouldings — precision components in nylon.** Exhibits include the Insulgrip fastener, nylon chain and coil bobbins.
GUEST KEEN AND NETTLEFOLDS (MIDLANDS) LTD. Box No. 24, Heath Street, Birmingham, 18.	C 109	**Nylon screws and Insulgrip fasteners.**
HALEX (DIVISION OF THE BRITISH XYLONITE CO. LTD.) Highams Park, E.4.	C 65	**Radio cabinets and components, television masks and components, refrigerator components, lighting fittings and miscellaneous industrial mouldings.** Selected household and toiletware moulded consumer products, and large-capacity tanks and bins.
INJECTION MOULDERS LTD. Westmoreland Road, N.W.9.	B 201	**Mouldings up to approximately 60oz. in all established thermoplastic materials.**
INSULATORS LTD. Leopold Road, Edmonton, N.18.	C 22	**General custom mouldings for radio, television, refrigeration, and electrical engineering industries.**

INJECTION MOULDING

J. F. KENURE LTD. Faggs Road, Feltham, Middx.	C 30	**Trade mouldings in all thermoplastics** from 1-40oz. Modern tool room and facilities for assembly, etc.
LONDON ASSOCIATION FOR THE BLIND Pelican House, 88-92 Peckham Road, S.E.15.	BB 506	**Mouldings in polystyrene, cellidor, polythene and Diakon.** A good range of attractive mouldings for the radio trade.
LONDON MOULDERS (PLASTICS) LTD. Buckingham Avenue, Trading Estate, Slough, Bucks.	B 204	**Various industrial and Blue Riband range of domestic products.**
METAL BOX CO. LTD. (THE) PLASTICS GROUP 37 Baker Street, W.1.	B 206	**Polytube polystyrene tubes for tablets and other small items and Polypot polystyrene pots for foods and toilet preparations.** Also on show will be components for packaging and industry, precision moulded in polythene, polystyrene, polypropylene, nylon and cellulose acetate.
MICA PRODUCTS LTD. Crystalate House, Mill Lane, Tonbridge, Kent.	CC 417	**Mouldings of all types in a wide range of thermosetting materials.** These include advertising signs — Babycham and Fremlins.
METROPOLITAN PLASTICS LTD. Faraday Way, St. Mary Cray, Orpington, Kent.	C 50	**Various trade injection mouldings.**
NATIONAL PLASTICS LTD. Avenue Works, Walthamstow Avenue, E.4.	C 24	**Trade mouldings.** Used for domestic appliance, radio, automobile industry, etc.
OLYMPIC PLASTICS LTD. Fourth Way, Exhibition Ground, Wembley, Middx.	BB 517	**Letters and technical components in acrylic, acetate, polystyrene, polypropylene, nylon, and polythene.**
OMEGA PLASTICS LTD. Highbridge Road, Barking, Essex.	C 104	**Mouldings in polystyrene, pvc, polythene, and cellulose acetate.** Specializing in packaging and display, electrical mouldings and components for the building industry.
PLYSU PRODUCTS LTD. Woburn Sands, Bletchley, Bucks.	CC 412	**Moulded components for the Supermaid range of housewares.**
THE PRESTWARE GROUP Southdown Works, Kingston Road, Raynes Park, S.W.20.	C 9	**Mouldings in polystyrene, nylon, polythene, and polypropylene.**
PUNFIELD AND BARSTOW (MLDGS) LTD. Basil Works, Westmoreland Road, Queensbury, N.W.9.	B 228	**Wide range of mouldings.** Accumulator cases, battery boxes, coil formers, mounting blocks, bobbins, switch dollies, scale blanks, grilles, knobs, valve holders, pointers, push-buttons, battery cases and heavy nylon mouldings.
SPA PLASTICS Freeman Works, Chesham, Bucks.	CC 404	**A range of mouldings in nylon, polystyrene, polypropylene, polycarbonate and other thermoplastics.** The exhibit is intended to show the diverse use of plastics in industries from precision engineering to cosmetics.
STREETLY MANUFACTURING CO. LTD. Streetly Works, Sutton Coldfield, War.	B 230	**Range of injection mouldings in a variety of materials.** Emphasis will be on foil decoration and Delrin mouldings.
TECALEMIT LTD. Plymouth, Devon.	BB 523	**Precision mouldings.**
THERMO PLASTICS LTD. Luton Road Works, Dunstable, Beds.	B 226	**T.P. 140 and T.P. 468.** New industrial-type container and new insulated container.
UNITED EBONITE AND LORIVAL LTD. Little Lever, near Bolton, Lancs.	BB 526	**Garden-spade handles.** Manufactured from polypropylene.
UNI-TUBES LTD. 197 Knightsbridge, S.W.7.	BB 535	**Injection mouldings of all types and also to customers' requirements.** Manufactured in nylon and polypropylene.
WILMOT BREEDEN LTD. 13-14 Oxford Street, Birmingham, 5.	B 212	**Mouldings in acrylic materials. Nylon polystyrene, cellulose acetate, cellulose acetate butyrate, and polypropylene and delrin.** Available as edge lighted signs, including an electrically-operated rotary type which displays four different mouldings, one at a time, for 5sec. intervals.

Extrusion

MACHINERY

AS would be expected in an exhibition of this kind, the range of extruders to be shown is wide. The gradual increase in L/D ratio is most marked, and whereas a very few years ago 15:1 was considered to be relatively new, 20:1 is now common, and even 24:1 machines are being made. More attention is being paid to cooling to allow the use of higher rpm; resistant alloys for screws and liners are now the rule and far more attention is being paid to screw design.

FAWCETT PRESTON AND CO. LTD. (Stand C88) will be exhibiting the Davis-Standard 6in. British Thermatic Extruder for the sheathing of wire and cable and the production of plastic tube, sheet, film and sections. The L/D ratio is 20:1 suitable for most materials, and a range of screws is to be included in the exhibit. The new machine has additional heating capacity but, more important perhaps in the days of adiabatic extrusion, greatly increased cooling facilities. Such a provision is too often forgotten.

BAKER PERKINS GRANBULL LTD. (Stand C45) will have their 2in., 2½in.

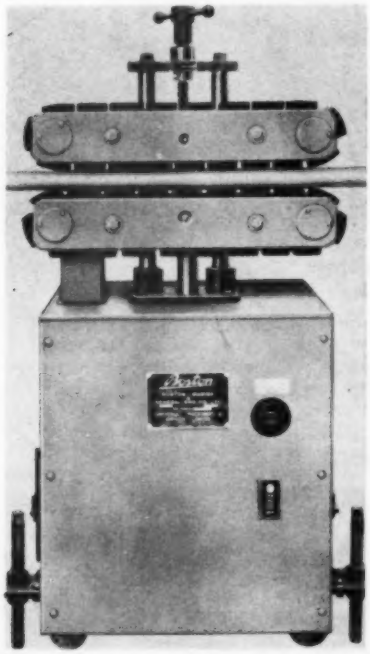

Fig. 7. Boston take-off machine, model D

and 3½in. extruders on show, the 2½in. being a new machine with many interesting features including induction heating and automatic controlled air cooling. It is powered by a 20hp motor with a variable speed coupling. INDUSTRIAL PLASTICS LTD. (Stand C83) will demonstrate their Bandera TR80 (3½in. screw diameter) and their Bandera TR45 (1½in. screw diameter). Both can be supplied with L/D ratios of 20:1 or 24:1. BROWN, DAVIDSON AND CO. LTD. (Stand C89) will be showing their 1½in. and 2in. extruders with single screws and built in compressor and air control. INTERNATIONAL CORPORATION LTD. (Stand A322) will be showing Berstorff extruders; PECO MACHINERY SALES (WESTMINSTER) LTD. (Stand C63) will exhibit their Peco 2½in. extruder in use with the Peco-Euromatic blow moulder; FRANCIS SHAW AND CO. LTD. (Stand C62) are to have their P4½in., P3½in. and P1in. machines, the P3½in. being a new design (on show for the first time) and GENERAL ENGINEERING CO. (RADCLIFFE) LTD. (Stand C43) will show their high speed 4½in. screw diameter, 120rpm and 2½in. 150rpm plastic extruders, together with a complete range of equipment for cable insulating and sheathing.

BATTENFELD (ENGLAND) LTD. (Stand C44) will be exhibiting Battenfeld Mashchinen-fabriken GmbH extruder machinery.

DIMON (ENGLAND) LTD. (Stand A306) will be exhibiting the Samafor extruder, Model BL65, working and making rigid pvc pipe.

R. H. WINDSOR LTD. (Stand C39) will be showing a standing model only of their 4½in. single screw extruder. The output of this machine is about 400lb./hr., depending on the material; it has infinitely variable screw speeds (10-80rpm) and the barrel heating is by induction. Rather more interesting perhaps is their RC100 twin-screw extruder complete with tube take-off equipment. This has a nominal output of 100lb./hr., but the valuable feature is that pulsation troubles and diameter variation troubles can be eliminated — such a common fault with single screw extruders particularly at low speeds. The extruder will produce rods, tubes and sections with great accuracy in rigid pvc, flexible pvc, polystyrene, polythene, cellulose acetate and other thermoplastics. The machine can be used for colouring all these materials, for the production of polythene film and layflat tube and cable insulation and sheathing.

BONE BROTHERS LTD. (Stand C91) will be showing film extrusion equipment for polythene layflat tubular film and also flat sheet cast film. This will include a 6in. extruder with a 36in. diameter tubular film die, part of a large export order to the USSR. MATTHEW WYLIE AND CO. LTD. (Stand C84) will be showing their 60/15D extruder suitable for all thermoplastic materials and their 60/20D extruder working with a BM500S blow moulding machine. This conversion of extruders for use with speciality blow

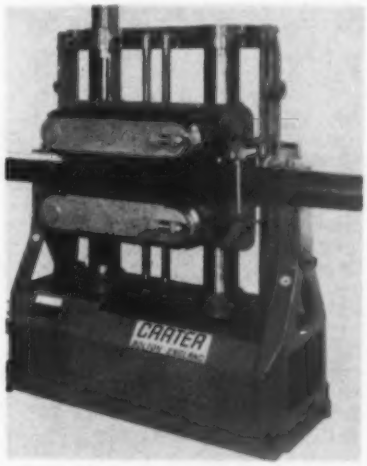

Fig. 8. The Carterpuller Haul-off

moulding equipment is an important feature to watch nowadays.

BUCKHAM AND SANDEMAN LTD. (Stand C98) will show two new extruders. The first is a new conception in extruding by OERLIKON PLASTIK known as the Rototruder, which adopts the little used principle of vertical extrusion and the new principle of a rotating extruder. The company will also be showing the J. u. W. Muller single-screw 40mm. and 60mm. extruders, and all equipment will be on show for the first time in Britain.

P. B. COW (PLASTICS) LTD. (Stand B204) will be demonstrating high quality welding techniques in the production of gaskets, etc. Flexible and rigid extrusions and welded forms will also be on the stand.

Ancillary Equipment

In the past the average extruder manufacturer, particularly in Britain, tended to regard the ancillary equipment as very secondary. One or two manufacturers then designed production lines with synchronized haul-offs and take-up equipment, water troughs, automatic saws and so on.

Today the situation is changing rapidly and a number of ancillary items are to be shown at the exhibition. Haul-offs and saws are perhaps the most common and are offered by several manufacturers.

Haul-off (or take-off) machinery has undergone various changes during the past few years. The problem is to achieve a positive pull quite free from

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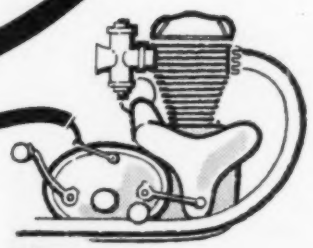

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Distillers Plastics Serve Everyman

EXTRUSION

slip even under wet conditions and yet not to mark the surface of what might be a still partially soft material. The caterpillar type of machine has been very successful with this sort of situation. SPEEDEX (ENGINEERING) LTD. (Stand C99) will be exhibiting their caterpillar haul-offs 0/3 and 0/12, the former being a new machine on show for the first time. THE BOSTON MARINE AND GENERAL ENGINEERING CO. LTD. (Stand C58) will be exhibiting their take-off machine Model 'D'. The traction is by means of power grip rollers and timing belts, and there is a choice of an infinitely variable speed range up to 400ft. per min. (see Figure 7). Distortion of the extrudate is avoided by the use of a completely new type of pvc caterpillar pad. Fawcett Preston and Co. Ltd. will show their 5,000lb. caterpillar haul-off capable of hauling cable up to 5in. diameter and operating at a maximum speed of 500ft. per min. Brown Davidson and Co. Ltd. will be exhibiting their haul-off with a fully universal twin track, and General Engineering Co. (Radcliffe) Ltd. are to show a belt type capstan unit and dual reel take-up.

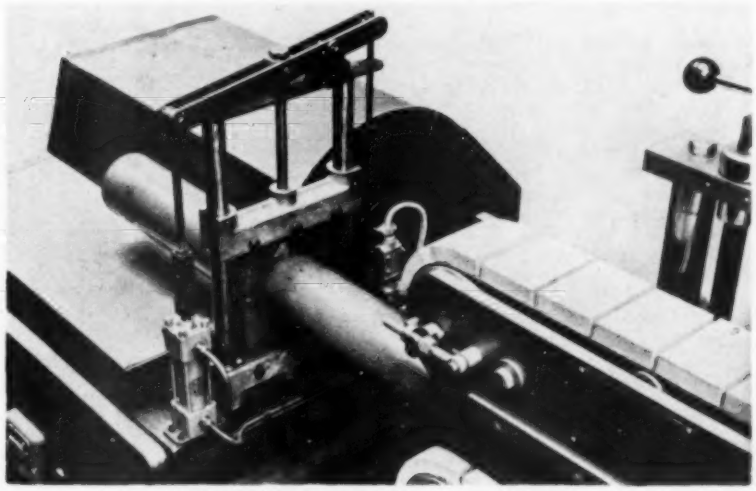


Fig. 9. The Boston fully-automatic saw

B. AND F. CARTER AND CO. LTD. (Stand A319) will be giving the first public showing of their two-way motorised variable speed caterpillar draw-off unit. The latest patented Carterpuller haul-off has infinite speed variation from 6in. to 400ft. per min., pulls up to 300lb. according to speed and caters for material up to 13in. deep (see Figure 8). Also on show will be the 24 carrier horizontal braider suitable for reinforcing nylon tubing, Albion counting instruments, a patented measuring machine for all types of extrusion, Ribble spring controlled centrifugal clutches and dial indicators and timers. Buckham and Sandeman Ltd. will also be showing J. u. W. Muller haul-off equipment.

Another important item of equipment nowadays is sawing equipment, particularly for the automatic sawing of rigid vinyl extrusions. Speedex (Engineering) Ltd. will have on show their Model C/3 automatic travelling circular saw capable of cutting both tubes and sections. Boston Marine and General Engineering Co. Ltd. will show their Boston fully automatic saw with a capacity of up to 6in. circular or square section or any irregular shape which will fit into a 6in. square. The feed speed is infinitely adjustable and the machine can be operated manually or automatically when pre-set lengths can be cut. A useful feature is the carriage which traverses under its own power, thus eliminating distortion and any backlash which would be transferred to the extruder (see Figure 9). Any plastic or rubber can be cut.

Miscellaneous equipment includes a selection of extruder screws showing modern designs and a selection of extruder crossheads for cables by Fawcett Preston and Co. Ltd.; a water bath by Brown, Davidson and Co., Ltd. which is completely mobile and fully universal adjustable and self contained; induction heaters, very widely used in the industry, by BEANWY ELECTRIC LTD. (Stand C87); a range of equipment for cables by General Engineering Co. (Radcliffe) Ltd., including control cabinets and measuring equipment, etc.; Meech Electric Drives (London) Ltd. (Stand C110) anti-static equipment, and Industrial Plastics Ltd. Barmag 12, part of a material reprocessing system showin,; water bath, snake cool, cube dicer, screw conveyor and dryer/313 vator which will be working on the stand.

PRODUCTS and MATERIALS

HITTING on a good, striking display for exhibits often proves to be a headache. BTR INDUSTRIES LTD. has been able to solve this problem neatly, since one of its main display pieces forms part of the actual structure of its stand (CC409). The company has developed its Plastidry hose — manufactured from a nylon or Terylene reinforced woven reinforced fabric to which is fused a pvc cover and lining — as a high-pressure inflatable framework for supporting temporary or permanent structures. Four lengths of this tubing — of 4in. bore and 24ft. span — is supporting the stand. (Figure 10).

The structure can be easily and quickly erected using either a portable air cylinder, a manual or power operated compressor or a small foot pump. Also on this company's stand is a pvc pipe run incorporating over 200ft. of pipes, fittings and valves.

A comprehensive range of thermoplastic pipes and fittings will be found on the DURAPIPE AND FITTINGS LTD. stand (C27A). This firm, which only began production in 1956, has reached a high standing in the industry, building up a store of technical knowledge on its subject, particularly with respect to ABS copolymers. It extrudes piping in three materials: ABS, high impact

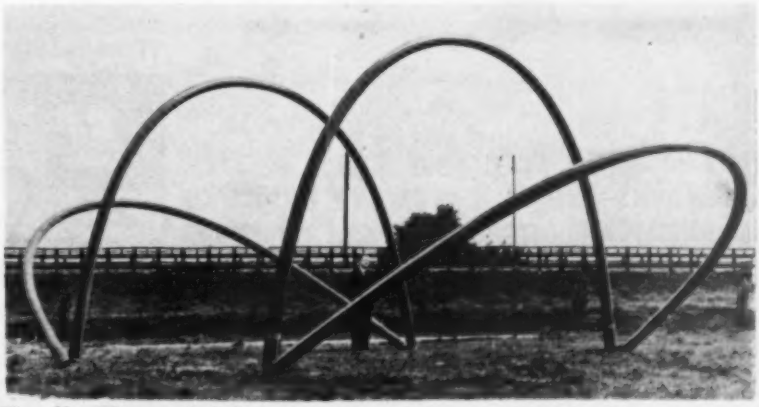
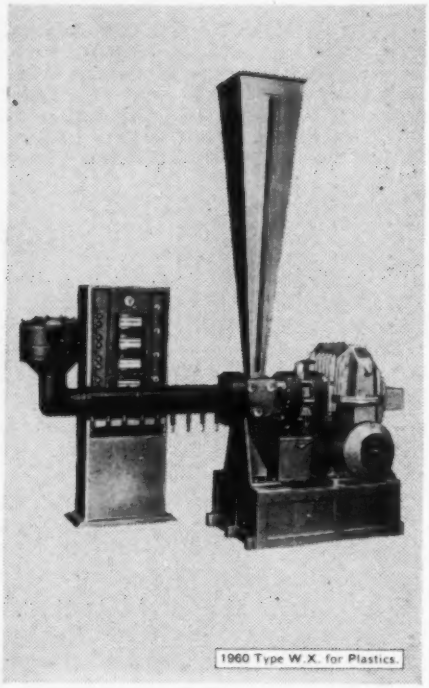
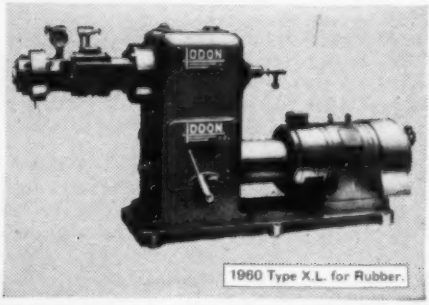


Fig. 10. These weird shapes are formed from BTR's Plastidry pvc/nylon hose. The company's stand is supported on four lengths of this hose

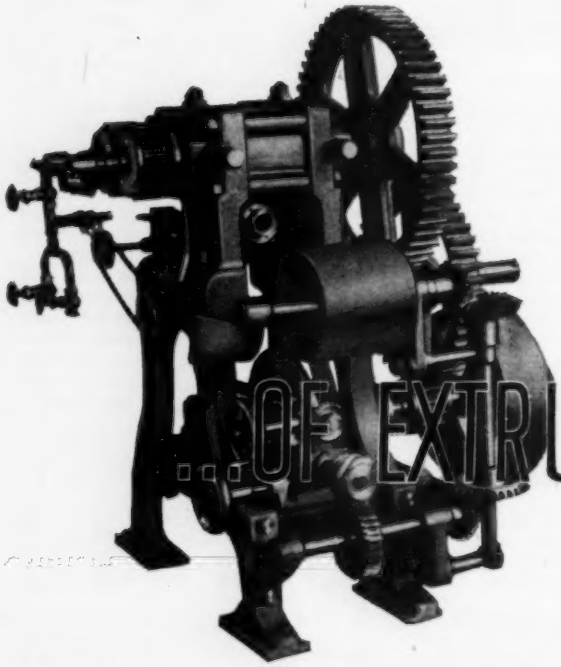
PIONEERS...



1960 Type W.X. for Plastics.



1960 Type X.L. for Rubber.



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EXTRUSION

pvc and high density polythene in lengths of 20ft. and bores from ⅛in. to 6in. The firm recently announced price cuts of up to 32% (*RPW* March 4, 334).

One of the largest profile extrusion centres in Europe is that of ERINOID LTD. (a member of the O. and M. Kleemann group) at Stroud, Gloucestershire. Covering 50,000 sq. ft., this company produces profile extrusions in polystyrene and copolymers, pvc and polythene (Stand B208). There is a special display of lighting diffusers and window frames.

Fig. 11. Pvc water-soluble film sachet releasing its contents. The film's matt finish, when used on the inner surface of the sachet, overcomes the problem of blocking, so that automatic packaging with pva is now a practical proposition

The packaging industry is a very large consumer of extruded sheet and film, and its rapid expansion has made a big contribution to the expansion of the polymer industry itself. (In 1953 it was estimated that British industry spent £300m. a year on packaging its products (all materials); by the end of last year this estimate had risen to some £600m.) The International Packaging Exhibition at Olympia in September will perhaps show the plastics packaging picture in finer detail, but more than a good outline is contained at Interplas.

The biggest firm concerned with packaging is the METAL BOX CO. LTD. This company's plastics group (Stand No. B206) is showing packaging in polythene, high density polythene and polythene-coated cellulose. A fairly new development by this company is vacuum frame filling of heavy duty polythene sacks. A number of these are displayed. In this method the polythene sack is blown out with compressed air, fed with material, and a 8-10in. vacuum drawn before heat sealing. The resulting container is rigid and stacks easily.

Water Soluble Film

An interesting development on the extruded film side is water soluble polyvinyl alcohol film. MAY AND BAKER LTD. is showing a new thinner gauge pva type (gauge 1¼thou.) on Stand B207. This is already being tried as a method of packing household detergents.

Pva, with its inertness to many chemical compounds and solvents can be used for packing pre-weighed quantities of toxic chemicals, dyes and printing inks, which are difficult or unpleasant to handle. Many other industrial and domestic products are dissolved in water before use — for example, photographic chemicals, agricultural and horticultural sprays, fire extinguisher chemicals and disinfectants and deodorants for water systems. The marketing of pre-weighed units in water soluble film is thus a logical step forward in the development of packaging.

May and Baker pva films are produced in gauges down to 1½thou., with a range of solubilities to suit the product being packed. The cost of these films is directly proportional to thickness so that the introduction of the new type — H15PM — which is half as thick as the previous lowest gauge, should open up fresh packaging outlets (Figure 11).

Submarine Cable

The $7m. contract obtained by British Insulated Callender's Cables Ltd. for a 53-mile submarine pipeline recently excited wide interest. This pipeline, which will carry natural gas to Vancouver Island from the Canadian mainland, will have at its heart a pipe of flexible pvc. The pipeline, and the part played in it by Geon pvc, is featured on the BRITISH GEON LTD. stand (B216). This company's pvc is already widely used in the cable manufacturing industry, and the exhibit sums up the opportunities open to cable manufacturers to utilize the oil, solvent and corrosion resistant properties of pvc.

Another company in the DISTILLERS PLASTICS GROUP, BRITISH RESIN PRODUCTS (on the same stand) is demonstrating an improved method of insulating overhead power distribution systems in factories, using Rockite phenolic extrusions. These are said to provide a complete cover for the busbars, and are heat-resistant, thus permitting an enclosed overhead system to be used in foundries and over furnaces. Straight and curved lengths of extrusion can be produced.

One company specializing in the precision extrusion of plastics is UNI-TUBES LTD., an off-shoot of the Smiths group of companies (Stand BB535). Their exhibit includes an alloy armoured ptfe pipeline and a number of pvc pipes splaying out from a section of helically convoluted hose. Also in the display are reels of pure ptfe tape, utilized in the manufacture of flexible non-corrosive pipelines.

LIST OF EXHIBITORS — EXTRUSION

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	**B 204**	**Pvc compounds.**
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	**B 216**	**Extruded sheet and tubing in polystyrene and pvc.** Piping in Geon high-impact pvc and Styron sheet for packaging. Recent development in curved phenolic extrusions.
THE DISTILLERS CO. LTD. CHEMICAL DIVISION Devonshire House, Mayfair Place, Piccadilly, W.1.	**CC 429**	**Bisoflex BCP butyl benzyl phthalate.** Plasticizers for pvc, recently introduced for high-temperature cables.
DOHM LTD. 167 Victoria Street, S.W.1.	**A 305**	**Reprocessed polythene.** Extrusion grade black with 2% carbon in guaranteed melt index from 0.3 to 7.
DU PONT CO. (UK) LTD. 76 Jermyn Street, S.W.1.	**C 74**	**Butacite polyvinyl butyral sheeting, Lucite acrylic resins, Alathon polythene, Zytel nylon, Delrin acetal resin, and Teflon fluorocarbon.** Numerous applications of these materials will be shown for the first time in the UK.

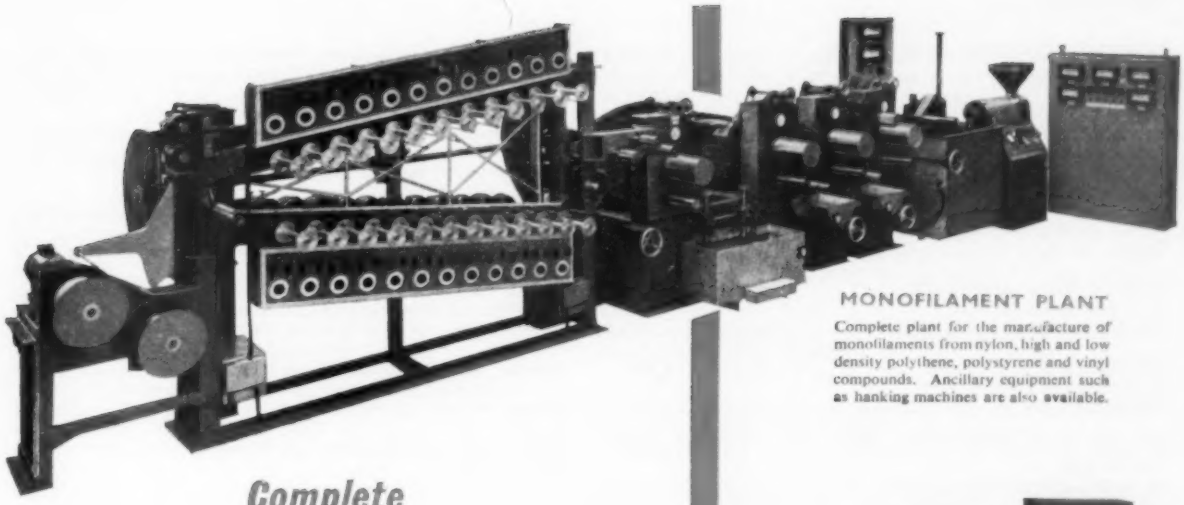
EXTRUSION

FARBWERKE HOECHST AG. Frankfurt Main, Western Germany. UK Representatives: Hoechst Chemicals Ltd. 50 Jermyn Street, S.W.1.	B 219	**Hostalen G high-density polythene. Hostalen PP polypropylene. Hostalit Z pvc/chlorinated polyolefine. Hostaflon C2 ptfce.** The Hostalen G range includes GM. 5010, the special pressure pipe compound; grades suitable for film, profile and general extrusion work are included in the PP range and several grades of Hostalit Z suitable for extrusion purposes will be shown.
FOSFATBOLAGET (STOCKHOLMS SUPERFOSFAT FABRIKS AB) Cardellgatan 1, Stockholm 5, Sweden.	BB 507	**Pevikon polyvinyl chloride resins.**
IMPERIAL CHEMICAL INDUSTRIES LTD. Plastics Division, Millbank, S.W.1.	C 66	**Propathene, pvc, Visqueen and Kralastic extruded articles.** These include piping for laboratory use, electrical conduit, rainwater goods, stackpipes and cold-water services.
M & B PLASTICS LTD. Dagenham, Essex.	B 207	**Technyl polyamides.** Now available in a wide range of types, including 6.6, 6.10, 6 and copolymers.
MONSANTO CHEMICALS 10-18 Victoria Street, S.W.1.	C 34	**Lustrex polystyrene T6 and polythene.**
PECHINEY-SAINT GOBAIN Agents: K. W. Chemicals Ltd. Caroline House, 55-57 High Holborn, W.C.1.	BB 534	**Polystyrene moulding materials, polythene moulding materials, pvc compounds, and vinyl compounds.**
PLASTTRADING LTD. Verenigd Plastic-Verkoopkantoor N.V., Zeist-Holland.	C 80	**Akulon-nylon granules and Stamylan-polythene granules.** For injection moulding and extrusion.
SHELL CHEMICAL CO. LTD. Old Burlington Street, W.1.	B 218	**Carlona P polypropylenes, Carlona high- and low-density polythene.** Carinex polystyrene and styrene/acrylonitrile copolymers.
STERLING MOULDING MATERIALS LTD. Sterling House, Heddon Street, W.1.	B 223	**Pvc compounds. Toughened polystyrene copolymers.** ST. 80 medium-impact and ST. 122 high-impact grades added to Sternite polystyrene range in February.
JOHN AND E. STURGE LTD. Wheeleys Road, Birmingham, 15.	BB 518	**Calofort S for pvc compounds. Calofort S, Calopake F and Sturcal M for polythene compounds.** Fillers giving good surface finish and high resistance to marring and scratching.
TELCON PLASTICS LTD. Telcon Works, Greenwich, S.E.10.	B 211	**Polypropylene and ABS resins.**
WANDEX PLASTICS LTD. 23 Pitfield Street, N.1.	C 11	**Extruded cellulose-acetate sheeting.** Main business of the company is supply of thermoplastic scrap.
WHIFFEN AND SONS LTD. Willows Works, Derby Road, Loughborough, Leics.	BB 525	**Ralsin Nylon 11.** Display of specimens of tubes, etc., extruded from Ralsin.

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BAKER PERKINS GRANBULL 39 High Street, Kingston upon Thames, Surrey.	C 45	**2in., 2½in. and 3½in. extruders.** The 2½in. model is a new design, including induction heating and auto-controlled air cooling.
BATTENFELD MASCHINENFABRIKEN GmbH Agents: Battenfeld (England) Ltd. Great South-West Road, Bedfont, Feltham, Middx.	C 44	**BE60 extruder.**
BEANWY ELECTRIC LTD. Bushey Lane, Tyseley, Birmingham, 11.	C 87	**Induction heaters for extrusion machines, with and without cooling facilities.** These heaters will also be shown fitted to extruders on the stands of some British extruder manufacturers.
BONE BROTHERS LTD. Manor Farm Road, Alperton, Wembley, Middx.	C 91	**Film extrusion equipment for polythene layflat tubular film and flat sheet cast film.** A 6in. extruder with 36in. diameter tubular film die which is part of a large plant to be exported to the USSR will be shown.
BROWN, DAVIDSON AND CO. LTD. Banchory Works, Hartley Wintney, near Basingstoke, Hants.	C 89	**1½in. and 2in. extruders with single screw, and a built-in compressor and air control.** Also shown will be haul-off equipment and twin universal water bath.



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Complete plant for the manufacture of monofilaments from nylon, high and low density polythene, polystyrene and vinyl compounds. Ancillary equipment such as hanking machines are also available.

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Throughout the world, Bone Brothers' complete plants are maintaining high output and efficiency under a variety of operating conditions.

Complete plants are supplied for extrusion coating and laminating, flat and tubular film, tubes and pipe, sheet sections and monofilaments.

Bone Brothers make a fine range of extruders under licence from Frank W. Egan & Co. of New Jersey, U.S.A. These, made up to 8 inches diameter and 32 to 1 screw length to diameter ratio, can be fitted with the Willert Patent Vapour Cooling System.

Development work carried out in our own laboratories and those of our associates in the U.S.A. keeps Bone Brothers in the forefront of the world's extruder manufacturers as is shown by our new range of high speed extruders which are in advance of any available.

If you have a problem connected with extrusion let us help you.

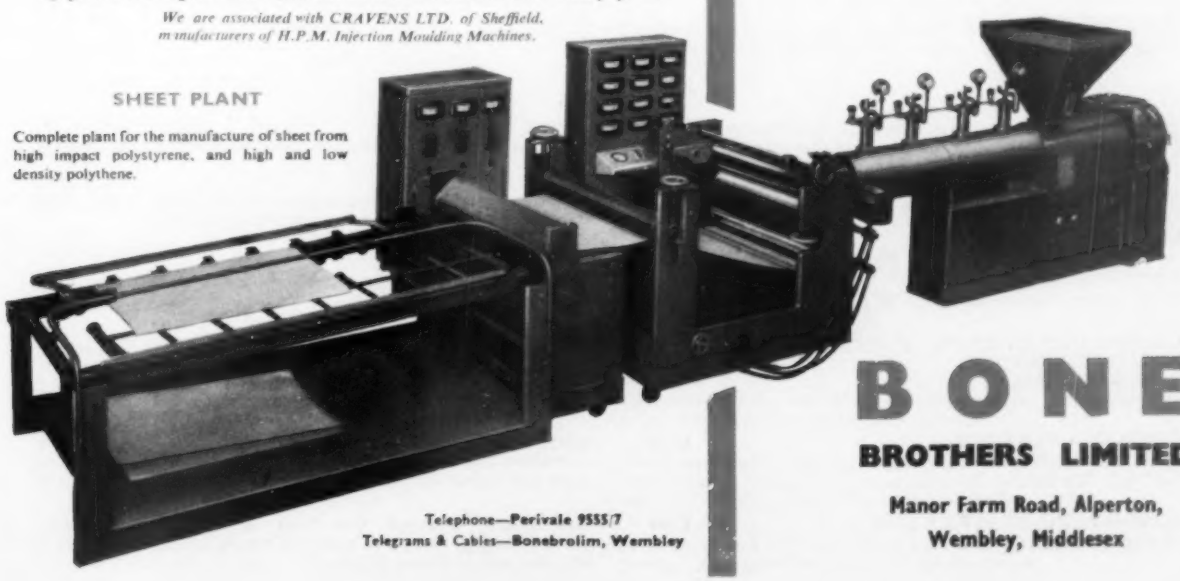
We are associated with CRAVENS LTD. of Sheffield, manufacturers of H.P.M. Injection Moulding Machines.

LAMINATING PLANT

30 inch laminating plant for coating paper, cellophane, aluminium foil and other materials with polythene by the extrusion process.

SHEET PLANT

Complete plant for the manufacture of sheet from high impact polystyrene, and high and low density polythene.



BONE

BROTHERS LIMITED

Manor Farm Road, Alperton, Wembley, Middlesex

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Telegrams & Cables—Bonebrolim, Wembley

EXTRUSION

BUCKHAM AND SANDEMAN LTD. William Curtis House, Alton, Hants.	A 313	**J.u.W. Muller single-screw 40mm and 60mm extruders.** Haul-off equipment will also be shown. All the exhibits are seen for the first time in the UK.
BUCKHAM AND SANDEMAN LTD. William Curtis House, Alton, Hants.	C 98	**The Oerlikon Plastik Rototruder vertical extruder.** This is a new concept in extruding, on show for the first time. Extrusion is vertical from a rotating extruder.
B. AND F. CARTER AND CO. LTD. Albion Works, Waterloo Street, Bolton, Lancs.	A 319	**Two-way motorized variable-speed caterpillar draw-off unit.** First public showing of prototype.
DIMON (ENGLAND) LTD. 181a Bath Road, Slough, Bucks.	A 306	**SAMAFOR BL.65 rigid-pvc pipe extrusion installation and SV.300 bottle-blowing unit.** Also on show will be the BG.120 polythene-face-cutting granulating installation.
ETHER LTD. Tyburn Road, Erdington, Birmingham, 24.	C 86	**Control instruments.** Transitrol temperature controller recorders and all temperature-measuring instruments for plastic machines will also be shown.
FELBER JUCKER AND CO. LTD. Brook House, 48 Upper Thames Street, E.C.4.	A 336	**Nebel range of extruding machines.** From Nebel Carlo Bellora, Milan.
GENERAL ENGINEERING CO. (RADCLIFFE) LTD. Bury Road, Radcliffe, Lancs.	C 43	**High-speed, 4½in., 120rpm. extruder. 2½in., 150rpm. extruder.** Range of ancilliary equipment for production of plastic-covered electric cables.
INDUSTRIAL PLASTICS LTD. 93 Regent Street, W.1.	C 83	**Bandera TR 80. Bandera TR 45.** Barmag 12E as part of a material reprocessing system showing water bath, snake cooler, cube dicer, screw conveyor, and a new dryer/elevator.
INTERNATIONAL CORPORATION LTD. 11 Cornwall Road, S.E.1.	A 322	**Berstorff extruders. Alquist and hyperbolic winders. Erhardt and Leimer edge guiders.**
MEECH ELECTRIC DRIVES (LONDON) LTD. 150 Clapham Manor Street, S.W.4.	C 110	**Complete service for static elimination.** All types of anti-static equipment will be exhibited.
PECO MACHINERY SALES (WESTMINSTER) LTD. 28 Victoria Street, S.W.1.	C 63	**Peco 2½in. extruder.** To be shown with Peco-euromatic blow-moulder.
FRANCIS SHAW AND CO. LTD. Corbett Street, Ashton New Road, Manchester, 11.	C 62	**P 4½in., P 3½in. and P 1in. extruders.** P 3½in. is on show for the first time.
SPEEDEX (ENGINEERING) LTD. 4 Parade Chambers, North Lane, Leeds, 6.	C 99	**Model 0/3 and model 0/12 caterpillar-type take-off machine. Model C/3 automatic travelling circular saw.** Both models are on show for the first time.
R. H. WINDSOR LTD. Leatherhead Road, Chessington, Surrey.	C 39	**RC 100 extrusion machine. 4½in. single-screw extruder.** Tube take-off equipment will be shown with the RC 100.
MATTHEW WYLIE AND CO. LTD. 71 Milnpart Street, Glasgow, S.1.	C 84	**Wylie/Fischer extruders.** 60/15D extruder suitable for all thermoplastics. 60/20D extruder working with a BM 500S blow-moulding machine.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

ASSOCIATED ELECTRICAL INDUSTRIES LTD. Crown House, Aldwych, W.C.2.	CC 415	**Instrument and equipment wire covered with ptfe.** Also ptfe rod tubing and yarn and plastic insulated cables.
BTR INDUSTRIES LTD. Herga House, Vincent Square, S.W.1.	CC 409	**Rigid pvc and polypropylene pipes and fittings.** By Hendry process.
CASCELLOID (DIVISION OF BRITISH XYLONITE CO. LTD.) Abbey Lane, Leicester.	C 65	**Cascapak squeeze-to-use polythene containers for detergents, shampoos, hand creams, insecticides and cosmetics.** Printed in up to four colours. Polythene lay-flat bags for pre-packed vegetables and nuts, and for the textile trade.
CHEMIDUS PLASTICS 26 Progress Way, Purley Way, Croydon, Surrey.	C 29	**Extruded unplasticized pvc pipes for the handling of corrosive liquids and fluids.** Also shown will be a range of pipes and fittings for the building industry.
COMMERCIAL PLASTICS LTD. 75 Grosvenor Street, W.1.	C 64	**Fablothene, Craypak pvc film, Iridon extruded pvc.** Lay-flat tubing, sheet film and bags for packaging and vacuum forming, and perfumed polythene.

EXTRUSION

P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	B 204	**Flexible and rigid extrusions and welded forms including magnetic gaskets.** High-quality welding technique in productions of gaskets.
DOHM LTD. 167 Victoria Street, S.W.1.	A 305	**Polythene black film, polythene piping.** Film for industrial bags, tarpaulins, road making and farming. Special economical farming-grade piping, and grades to BSS.
DURAPIPE AND FITTINGS LTD. Winnock Road, West Drayton, Middx.	C 27a	**Thermoplastic pipe and fittings which are rigid and non-corrosive.** The pipe and fittings in three different materials: Durapipe K — abs copolymer; Durapipe V — high-impact rubber modified pvc; and Durapipe Z — high-density polythene.
ERINOID LTD. West Halkin House, West Halkin Street, Belgrave Square, S.W.1.	B 208	**Extruded lighting fittings, window frames, electrical conduit and other profiles.**
B. J. HAMLIN LTD. 66-68 Haymarket, S.W.1.	BB 512	**Makrolon Polycarbonate, Mipolam pvc decorative sheeting, flooring and tiles.** Wide range of patterns and designs will be exhibited.
METAL BOX CO. LTD. (THE) Plastics Group, 37 Baker Street, W.1.	B 206	**Diothene polythene film.** Densothene high-density polythene film.
MELWOOD THERMOPLASTICS LTD. Willoughby Road, Harpenden, Herts.	CC 422	**Extruded profile sections.** Woodplast plastic-clad wooden window. Barclay rainwater goods.
MILLS COMMERCIAL SUPPLIES LTD. 241a High Street, Acton, W.3.	A 312	**Noise-abatement rings for domestic dustbins.** Recommended by the Noise Abatement Society.
PLAST TRADING LTD. Verenigd Plastic-Verkoopkantoor N.V., Zeist-Holland.	C 80	**Akulon and Stamylan products.** Akulon extruded rod in diameters up to 8in.
SARO PRODUCTS LTD. Folly Works, Whippingham, East Cowes, I.W.	C 77	**Saroy high-impact polystyrene sheet. Sarrac, rigid type H, ABS extruded sheet. Dowpac, a media for biological filter. Sar-Rez liquid plastic wood finish.**
SPICERS LTD. 19 New Bridge Street, E.C.4.	BB 529	**Netlon, integrally extruded mesh,** will be exhibited in range of thermoplastics in sheet, layflat and tubular form covering broad, actual and potential uses in the industrial field.
STANLEY SMITH AND CO. Worple Road, Isleworth, Middx.	B 227	**Vitrone rigid and flexible pvc extrusions. Vitrathene polythene extrusions.**
SUNTEX SAFETY GLASS IND. LTD. Thorney Lane, Iver, Bucks.	BB 528	**Range of industrial mouldings.** Aircraft canopies and panels, fluorescent lighting reflectors and diffusers, medical arm and leg baths, bus and coach lighting fittings and roof panels, scooter screens, cast and extruded acrylic tubes, and plastics illuminated signs.
SWEDISH CORDAGE CO. LTD. P.O. Box 97, Malmö, Sweden. Trade name: Lavella Plastic.	BB 507	**Profiles, hoses and tubes, and furniture cords and strings.** Also polythene monofilament for cordage, lines, and fishing nets.
TECALEMIT LTD. Plymouth, Devon.	BB 523	**Nylon tubing and high-pressure hose.** A range of sizes from $\frac{1}{4}$in. o.d. to $\frac{1}{2}$in.
TELCON PLASTICS LTD. Telcon Works, Greenwich, S.E.10.	B 211	**Extruded sheeting in polystyrene, polythene and pvc.** New grade of Telcovin TL pvc for corrosion-proof tank linings.
TENAPLAS LTD. Upper Basildon, Berks.	C 105	**Tubing and sections in rigid and flexible pvc, polythene, nylon, polystyrene and polypropylene.** Polythene tubing up to 18in. bore and polypropylene tubing.
UNITED EBONITE AND LORIVAL LTD. Little Lever, near Bolton, Lancs.	BB 526	**Pvc conduit tubing.**
UNI-TUBES LTD. 197 Knightsbridge, S.W.7.	BB 535	**Extruded tubing and film of varying sizes.** Manufactured in polypropylene, pvc, nylon and polythene.
VINATEX LTD. Carshalton, Surrey.	B 217	**Rigid and highly flexible extrusions from Vinatex vinyl compounds.** These include specialized applications such as non-toxic tubing, cable insulation and sheathing.
YORKSHIRE IMPERIAL METALS LTD. P.O. Box 166, Leeds, Yorks.	C 26	**Polyorc B and BH pvc pipes and fittings and rainwater goods.** Alkathene extrusions will also be shown.

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Look into almost any refrigerator and you'll find proof of Styron as a perfect vacuum forming material. Liners in this popular polystyrene transform a box into an attractive unit in which food is packed and preserved neatly, hygienically. Emerging from cold storage, these Styron virtues are now giving shape and superiority to thin-walled containers for prepacked foods, disposable cartons for soft drinks, heat-resistant beakers for auto-vended hot drinks, closures and containers for a wide range of foodstuffs. Easily formed Styron permits mass produced low cost packaging. Clean, colourful, eye-catching Styron adds its own sales appeal to any product.
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Vacuum Forming

MACHINERY

AT one time vacuum forming was regarded as a rather specialized technique for the batchwise production of a comparatively small number of medium or large objects. Today this conception is rapidly changing and continuous, rapid and automatic equipment is available. Such objects as small trays, cups and packages of all kinds are produced on a really large scale.

T. H. AND J. DANIELS LTD. (Stand A326) are exhibiting two types of vacuum-forming machines. The first is the 30/30 RDP Type 2 for general purpose vacuum forming (See Figure 12). It is equipped for drape forming, plug assistance and bubble pre-stretching. The heater has a capacity of 16kW. and the machine is suitable for forming all thermoplastic materials. Sheets up to 30in. square and 0.125in. thick can be accommodated. The second is the 40/30 vacuum-forming machine. It is lighter than the 30/30 and is intended for vacuum covering and forming thermoplastic sheets up to

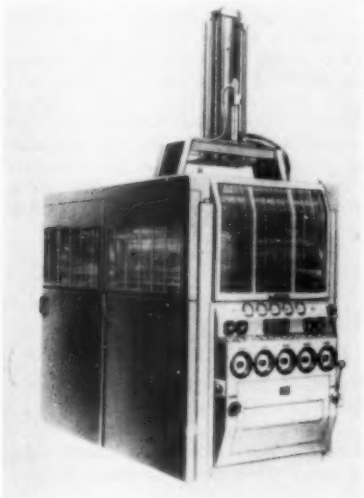


Fig. 12. Daniels 30/30 RDP type 2 vacuum-forming machine

0.060in. thick. As the clamp is hand operated, and no power operated plug mechanism is fitted, the need for interlocked guards is avoided. The machine is fitted with a vacuum pump but an external supply of compressed air is required.

INDUSTRIAL PLASTICS LTD. (Stand C83) are to have on show their Rotoform 608, one of the Plastiform automatic vacuum-forming machines. The machine is automatic and continuous and will give 20 mouldings per hour with thick material and 1,200 per hour with thin material. The only manual operation is the loading of the material which is taken into the machine by a chain system. It is heated both sides before forming and compressed air ejection of parts is provided. The machine can even be supplied with trimming equipment if required and the forming cycle can be 2sec. up to 2min., depending on the thickness of material and size of components. The maximum forming area is 23½in. x 31½in. and maximum throughput of material is approximately 1,000ft. per hour.

F. J. EDWARDS LTD. (Stand A302) will be exhibiting their Bescovac vacuum-forming machine which can have either fully automatic cycle or can be push button controlled (see Figure 13). Once set, the machine can be operated by unskilled labour. On push-button control it is possible to operate the heater traverse, inflation, drape table movement and the vacuum. Automatic operation can be employed to motivate a wide sequence of operations such as straight vacuum forming, drape forming with or without pre-stretching and so on. The Elstein infra-red heater is divided into three separately controlled zones and the speed at which the drape table rises and falls can be controlled to offset the cooling effect. All operations can be simply operated so that the equipment is virtually fool-proof and gives first-class precision products. Some ancillary equipment is also on show in the form of the Besco type HB 36/24 horizontal bandsawing machine for cutting out vacuum-formed components. The ELGAR MACHINE TOOL CO. LTD. (Stand C61) is to show the Illig vacuum-forming machines. In particular they will exhibit the Illig UA.100 automatic machine complete with plug assist mechanism and air cooling fans. PARNALL AND SONS LTD. (Stand C92) will be showing two new Parnavac vacuum-forming machines for the first time.

DIMON (ENGLAND) LTD. (Stand A306) will be exhibiting working vacuum thermoforming equipment, Model SP158, making 3.7 cu. ft. refrigerator liners.

A certain amount of auxiliary equipment will also be on show. P. AND R. ELECTRICAL (LONDON) LTD. (Stand A328) will be exhibiting various types of electrical equipment. One will be infra-red platens for vacuum-forming machines fitted with Elstein sealed ceramic elements on specially constructed aluminium channels available in all sizes. All types of the Elstein sealed ceramic elements will be demonstrated;

Fig. 13. The Edwards Bescovac vacuum-forming machine

the elements emit 97½% infra-red radiation and are guaranteed for 10,000 burning hours. G. PERRY AND SONS LTD. (Stand C16) will show machined aluminium and Kirksite moulds. INTERWOOD LTD. (Stand A335) will be exhibiting the patented TVF twin vacuum shaping and veneering press for fixing laminates to panels and also to plastics shapes such as wash basins.

PRODUCTS AND MATERIALS

A RECENT important development on the materials side of vacuum forming is biaxially oriented polystyrene. Containers and other products made from this material have improved impact strength due to the orientation of the polymer, but this very virtue has led to certain difficulties in vacuum forming. These can be overcome with adjustments to the usual technique—higher clamping forces are necessary for example, and the heating time must be carefully controlled. MONSANTO CHEMICAL CO. LTD., which recently announced a major sales drive on biaxially oriented polymers, is showing its Polyflex oriented polystyrene on Stand C34. At the moment the sheet and film are imported from America, but the company hopes to build up sales to the manufacturing level in two years' time.

Acrylonitrile butadiene styrene copolymer is now well established as a tough and versatile fabricating material, although it is only in the last five years that it has been used in any quantity in the UK. When vacuum forming ABS sheet, deep draws with reasonably regular wall thicknesses are possible, and, walking round the show, many examples will be seen of light-

VACUUM FORMING

weight luggage (using leather embossed sheet) and car mouldings such as dashboard covers and the interiors of door panels.

Examples of this type of work can be seen on the stand of NORTH BRITISH RUBBER CO. LTD. (CC419), which manufactures ABS sheet under the trade name Royalite. Recently this material has been adopted for parts of the interior body trim on airliners such as the Comet, Boeing 707 and the new Vickers Vanguard.

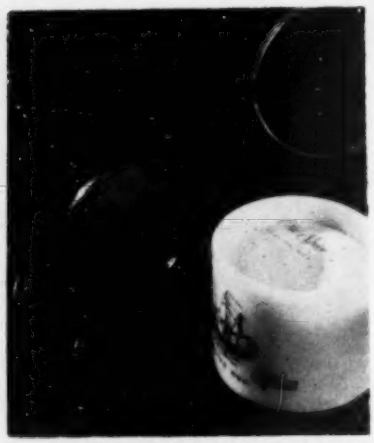


Fig. 14. Formed shaving mug covers made from Monsanto Polyflex biaxially oriented polystyrene

ANCHOR CHEMICAL CO. LTD. (Stand CC421) is also featuring ABS materials; the company is the UK agent for Cycolac, the polymer produced by the Marbon Chemical Division of the US Borg-Warner Corporation. On its stand the company hopes to have a cutaway model of the all-plastics interior of the 'car of tomorrow', if this can be transported in time from New York, where it has been a feature of Marbon's stand at the American Society of the Plastics Industry's Exposition (Figure 15). The seat shells, inside door liners and trunk liner sections have been vacuum formed in ABS.

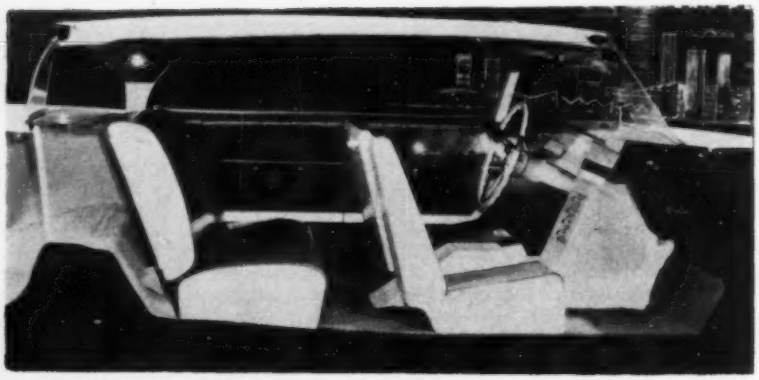


Fig. 15. ABS vacuum formings in this 'all-plastics car of tomorrow' include seat shells and door liners

A wide range of quality formings can be seen on Stand C65, where HALEX LTD., a member of the BRITISH XYLONITE GROUP, is showing a wide range of components for the refrigeration, television and car industries.

Well worth a visit is Stand B211, where TELCON PLASTICS LTD., a member of the BICC group, is exhibiting an extensive range of thermoplastic sheeting, primarily for vacuum forming and fabrication into containers and casings, etc. There is sheeting in polystyrene and copolymers, polythene, rigid pvc and, of special interest, in polypropylene. Telcon is one of the leading producers of polypropylene sheet in Europe. Manufactured in thicknesses ranging from 0.020in. to $\frac{3}{8}$in., and widths up to 55in., this material lends itself readily to vacuum-forming, and has the advantage of being able to withstand temperatures up to 150° C. Another type of sheeting now being produced is a special grade of plasticized pvc, Telcovin TL, as a corrosion proof liner for acid baths. This is available in conjunction with welding rod and strip, and special adhesives.

Thermoplastic sheeting for vacuum forming is also to be found on Stand C68, where STOREYS OF LANCASTER are showing Plastovac P. This is a hard abrasive resistant vinyl sheeting specially developed for use in the vacuum covering process, and available in an extensive range of attractive colours, printed effects and embossing, offering wide scope for product styling.

LIST OF EXHIBITORS — VACUUM FORMING

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BRITISH CELANESE LTD. Celanese House, Hanover Square, W.1.	**B 215**	**Clarifoil and Cellastine acetate film and sheet, and Celatron high-impact polystyrene sheet.** Vacuum-forming and deep-drawing grades.
BX PLASTICS LTD. Higham Station Avenue, Chingford, E.4.	**B 224**	**Bextrene polystyrene sheet. Cobex rigid vinyl.** Also on show is Velbex flexible pvc for vacuum covering.
P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	**B 204**	**Pvc compounds.**
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	**B 216**	**Polystyrene formings for packaging applications.** Geon pvc and Rigidex vacuum-forming grades are also manufactured.
ERINOID LTD. West Halkin House, West Halkin Street, Belgrave Square, S.W.1.	**B 208**	**High-impact polystyrene sheet.**
FOSFATBOLAGET (STOCKHOLMS SUPERFOSFAT FABRIKS AB) Cardelligatan 1, Stockholm 5, Sweden.	**BB 507**	**Pevikon polyvinyl chloride resins.**

VACUUM FORMING

B. J. HAMLIN LTD. 66-68 Haymarket, S.W.1.	**BB 512**	**Astralon pvc copolymer sheet, Makrolon polycarbonate sheet and celluloid, optical and non-optical grades.** Vacuum-forming and deep-drawing grades.
IMPERIAL CHEMICAL INDUSTRIES LTD. Plastics Division, Millbank, S.W.1.	**C 66**	**Water tanks in Darvic.** The theme of the I.C.I. exhibit will be plastics in building, exhibited with applications of a range of I.C.I. materials.
IRIDON LTD. Willington Quay, Wallsend-on-Tyne, Co. Durham.	**C 64**	**Sheeting for vacuum-forming applications.** High-impact polystyrene, low- and high-density polythene, polypropylene, ABS, CAB, pvc, CA and methyl methacrylate.
M and B PLASTICS LTD. Dagenham, Essex.	**B 207**	**Vacuum-forming grades of sheeting in a wide variety of materials.** Acelon, Rhodialine and Rhodoid cellulose acetate, Rhovilene vinyl copolymer, Rholene hd polythene and Mirralon metallized cellulose acetate.
MONSANTO CHEMICALS LTD. 10-18 Victoria Street, S.W.1.	**C 34**	**Polyflex bi-axially oriented polystyrene sheet.** Designed for vacuum and pressure forming — especially for packaging applications.
SIC PLASTICS LTD. 12 Whitehall, S.W.1.	**C 23**	**Sicostyrol 581 styrene copolymer sheets.** A tough sheet material for vacuum forming and fabrication, having superior draw properties.
STANLEY SMITH AND CO. Worple Road, Isleworth, Middx.	**B 227**	**Vitrone pvc.** Unplasticized, rigid deep-drawing sheet for vacuum forming.
STERLING MOULDING MATERIALS LTD. Sterling House, Heddon Street, W.1.	**B 223**	**Pvc compounds and toughened polystyrene copolymers.** ST.80 medium-impact and ST.122 high-impact grades recently added to polystyrene range.
UNIVERSAL SELLERS LTD. 4a Kidderpore Avenue, N.W.3. Agents for La Franco-Italienne de Plastique-France.	**CC 447**	**Transvyl LAFIP and Decorvyl LAFIP vinyl copolymer sheeting.** Clear and decorated sheets in a range of designs including wood-grain and marble effects.
UTILEX LTD. Mill Street, Kingston upon Thames, Surrey.	**BB 505**	**Cellulose-acetate films, clear transparent and coloured.** Also metallized grades.

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

T. H. AND J. DANIELS LTD. Greener House, 66-68 Haymarket, S.W.1.	**A 326**	**30/30 RDP Type 2 vacuum-forming machine.**
DIMON (ENGLAND) LTD. 181a Bath Road, Slough, Bucks.	**C 97**	**Vacuum thermoforming SP.158 vacuum-forming machine.**
F. J. EDWARDS LTD. 359-361 Euston Road, N.W.1.	**A 302**	**Bescovac vacuum-forming machine. Besco Type HB 36/24 horizontal bandsawing machine.** Bescovac can be operated on push-button control or fully automatic.
ELGAR MACHINE TOOL CO. LTD. 172-178 Victoria Road, Acton, W.3.	**C 61**	**Illig vacuum-forming machines.** Illig UA 100 automatic machine complete with plug-assist mechanism and air-cooling fans.
FELBER JUCKER AND CO. LTD. Brook House, 48 Upper Thames Street, E.C.4.	**A 320**	**Schulte range of vacuum-forming machines.** Vacuum-packaging machines are also to be shown.
INDUSTRIAL PLASTICS LTD. 93 Regent Street, W.1.	**C 83**	**G.B.F. Plastiniector and Plastiform.**
INTERWOOD LTD. 326 Old Street, E.C.1.	**A 335**	**TVF Twin vacuum-shaping and veneering press** for similar pressing work or affixing plastics shapes such as wash basins for modern bedroom furniture.
JOHN KIMBELL AND CO. LTD. 4 South Lambeth Road, S.W.8.	**A 333**	**Formseal, by Formvac formerly Hydro-Chemie.** An automatic moulding and trimming machine.
MARKMASTER (TRADING) LTD. 39 Victoria Street, S.W.1.	**C 49**	**Markmaster dry-colour marking, blocking and hot-stamping machines.** The Major, largest standard machine of its kind, and completely automatic, electronically-operated tube-measuring and marking machine will be exhibited for the first time.
MILES COMMERCIAL SUPPLIES LTD. 241a High Street, Acton, W.3.	**A 312**	**Electromagnetic press tool.** Automatic feed — for use in banks — process timed.

VACUUM FORMING

PARNALL AND SONS LTD. Lodge Causeway, Fishponds, Bristol, Glos.	C 92	**The Parnavac range of vacuum-forming machines.** Two new machines will be on show for the first time.
P. AND R. ELECTRICAL (LONDON) LTD. Pearl House, 1 Berrymead Gardens, W.3.	A 328	**Infra-red platens for vacuum-forming machines and Elstein sealed ceramic elements.** Special ceramic elements emitting 97% infra-red radiation. Guaranteed for 10,000 burning hours.
G. PERRY AND SONS LTD. Hall Lane, Aylestone, Leics.	C 16	**Machined, aluminium and kirksite moulds.** Pattern-making services available.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

ASSOCIATED ELECTRICAL INDUSTRIES LTD. Crown House, Aldwych, W.C.2.	CC 415	**Vacuum-formed diaphragm** — for pump whose working parts are of ptfe.
B. ATTEWELL AND SONS LTD. Reflection Works, Thorney Lane North, Iver, Bucks.	BB 508	**Formed mouldings in polystyrene, pvc and ABS.** Tote boxes for use in the catering industry, passenger service unit cover panels in use in the D.H. Comet.
CASCELLOID (DIVISION OF BRITISH XYLONITE CO. LTD.) Abbey Lane, Leicester.	C 65	**Vacuum-formed inserts for cases which include electric razors, tools, chocolates and crystallized fruits.** Vacuum-formed stone-wall panels and corner pieces for building interior artificial stone walls.
EKCO PLASTICS LTD. Ekco Works, Southend-on-Sea, Essex.	C 67	**Vacuum-formed refrigeration liners, door liners, etc.**
HALEX (DIVISION OF THE BRITISH XYLONITE CO. LTD.) Highams Park, E.4.	C 65	**Refrigerator liners door panels, etc. Lighting fittings, panels ceiling lighting.** Miscellaneous vacuum formings for industry.
KINGCRAFT LTD. Mill Street, Kingston upon Thames, Surrey.	BB 505	**Cellulose-acetate mouldings.** Clear containers, blister packs and displays — also coloured and metallized products.
THE NORTH BRITISH RUBBER CO. LTD. P.O. Box 47, Castle Mills, Edinburgh, 3.	CC 149	**US Royalite — nitrile thermoplastic sheet.** Unique application in the television field.
THE PRESTWARE GROUP Southdown Works, Kingston Road, Raynes Park, S.W.20.	C 9	**Vacuum-formed articles.** Also on display will be advertising novelties.
OLYMPIC PLASTICS LTD. Fourth Way, Exhibition Grounds, Wembley, Middx.	BB 517	**Mouldings in Perspex, acetate, pvc and polystyrene.** Technical components and trays.
OMEGA PLASTICS LTD. Highbridge Road, Barking, Essex.	C 104	**Mouldings in polystyrene, pvc, polythene, cellulose acetate.** Especially for packaging, display, radio and TV building, and new display of industrial trays.
STOREYS OF LANCASTER White Cross, Lancaster, Lancs.	C 68	**Plastovac P.** A hard vinyl sheeting for vacuum covering.
SUNTEX SAFETY GLASS IND. LTD. Thorney Lane, Iver, Bucks.	BB 528	**Aircraft canopies and panels, fluorescent lighting reflectors and diffusers, medical arm and leg baths.** Bus and coach lighting fittings and roof panels, scooter screens, cast and extruded acrylic tubes, plastic illuminated signs.
TENAPLAS LTD. Upper Basildon, Berks.	C 105	**Light diffusers and lamp-shades.** Lighting troughs and windshields.
THERMO PLASTICS LTD. Luton Road Works, Dunstable, Beds.	B 226	**Refrigerator components and fascia pads.** Pads are polyurethane-foam filled.
VINATEX LTD. Carshalton, Surrey.	B 217	**Dolls, toys, display items, etc.** Made from Vinatex pvc pastes.

Coating and Dipping

MACHINERY

PRINTING machinery is now becoming an important part of the plastic processer's equipment. Whereas at one time printing was an unnecessary evil, the advent of attractive packs has led to a need for first-class, high-speed equipment operating in conjunction with plastics machinery. Equipment specially for the plastics industry may be seen at the exhibition.

EDLON MACHINERY LTD. (Stand C19) will have a wide range of printing equipment on show. The Grauel is a three-colour flat bed off-set press specially designed for printing flat or fancy shaped containers. Another Grauel product will be a small off-set proofing press, Model R 1/MF—3F (shown in Figure 16). Another exhibit will be the Montoli four- or five-colour fully-automatic off-set press for circular or conical shaped bottles, tubes or even cups. Special features of the machine are high speed and twin printing cylinders which give a greater printing speed, for example, when decorating bottles up to 2¼in. diameter. Another interesting model is the new fully-automatic Kammann Model K17 printer for decoration by the silk screen process of plastic objects. It automatically feeds, pre-treats, registers, prints and transfers bottles to a drying oven at a speed of up to 4,500 units per hour. The machine is electronically controlled and the pre-treatment can be used with either a supply of town gas, butane or propane. PHILLIPS BROS. AND ELLIS LTD. (Stand C82) will exhibit dry printing equipment including a new range of extremely versatile marking equipment for all types of plastic mouldings and extrusion.

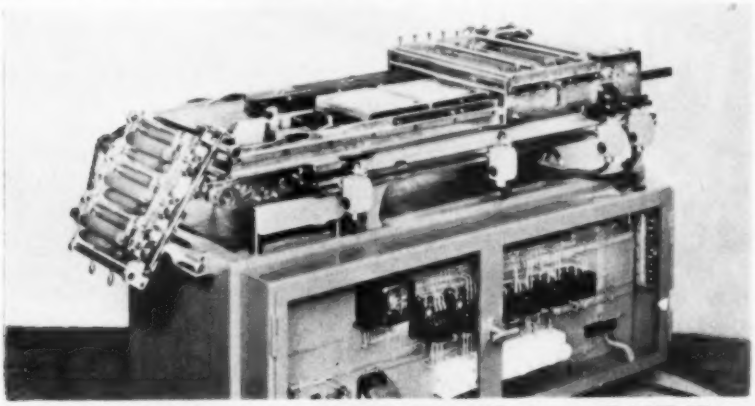


Fig. 16. Edlon Machinery Ltd.'s three-colour off-set press, R.1/MF-3F

Marking Demonstration

Actual demonstrations of marking machines will be given by MASSON SEELEY AND CO. LTD. (Stand BB539). A particularly interesting machine is the Model 60, specially designed to print around the complete periphery of circular and tubular products. There is an automatic register. The printing is accomplished by a clean dry process so that the products can be handled immediately they leave the machine. A wide range of marked products will be on view, and skilled personnel will be available to discuss difficult problems.

In the field of dip coating DOHM LTD. (Stand A305) will be exhibiting various equipment. The Dohm Bantam dip-coating machine is unique in that it has only one oven with a very low fuel consumption, and the greatest degree of accurate control is maintained over the whole dipping process. The overall dimensions of the plant are only 9ft. 6in. x 10ft. 4in. Ancillary equipment includes spare tanks, complete fluidising units, shot blast equipment and metallic abrasives. In the field of materials there is the Dohmpowder fine polythene. This is prepared specially for the dip coating of metal articles, and is non-corrosive, insulating and available in natural and colours. There are special grades for flame spraying, for the treatment of textiles and for the Engels process.

In addition to polythene for dip coating or hot spraying nylon is also available. It adheres more strongly to surfaces, withstands higher temperatures, has greater chemical and abrasion resistance, the latter being of the greatest importance. Both the polythene and nylon are available in a range of colours. The materials are ideal for use in the Bantam dip-coating machine, the overhead oven eliminating separate pre-heating and curing ovens. Another important feature is that moveable powder tanks facilitate colour or material changes.

INTERWOOD LTD. (Stand A335) will be exhibiting polyester coating and glue spreading machines. These include the LGM polyester and nitro-cellulose lacquer pouring/coating machine; the Klam/M patented glue spreader and mixer combined; the LAF/GA bench glue spreaders; the LAL automatic motorized strip glueing machine; the Selo portable; the Manual Contact adhesive spreader and the GL hand glue spreader.

Web Processing

HENRY SIMON LTD. (Cheadle Heath, Stockport—Stand C12) have announced the conclusion of a licence agreement with the Midland-Ross Corporation of Cleveland USA for the manufacture and sale of its Waldron web processing machinery. It will be sold under the name Simon-Waldron, and a range of equipment will be on show at the exhibition. Plastics manufacturers will be particularly interested in equipment for the coating, printing, embossing and extrusion laminating of supported and unsupported sheet and films to make such products as leathercloth, raincoat material, pressure-sensitive tapes, floor covering and packaging material.

PRODUCTS and MATERIALS

A FEW years ago only polythene powders were generally used for dip-coating; now a variety of plastics are used in this process. One firm with a wide range is TELCON PLASTICS, LTD. (B211); powders produced include cellulose acetate butyrate, pvc, and epoxy resins. Cab gives a pre-eminently decorative finish, the pvc is in two grades, giving a rigid or resilient finish, and the development of the epoxy resin powder means that the convenient and economical fluidized-bed coating technique can be used to protect metal articles. Epoxies are the first thermosetting resins to be adapted for powder coating.

DOHM LTD. (Stand A305) is another firm supplying powders for coating purposes: nylon and polythene powders suitable for dip-coating or flame spraying are shown. Nylon coatings show special solvent resistance. New on the MAY AND BAKER (M AND B PLASTICS LTD.) stand are ptfe powders and dispersions shown for the first time at this exhibition.

A firm which has done outstanding work in the dip-coating of metals field is PLASTIC COATINGS LTD. (Stand C10).

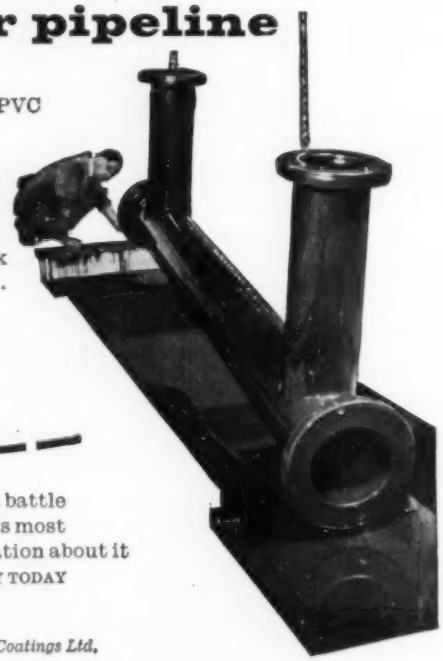
atomic Dreadnought

20,000 lead bars, dip-coated with Geon PVC, are doing a vital job aboard the new atomic submarine HMS Dreadnought. Stacked around the hull, the lead provides necessary ballast, Geon PVC provides an anti-corrosion coating . . . acts as an insulation . . . protects the vessel's metal parts from electrolytic decomposition.

Geon PVC protects...

salt water pipeline

This is part of a salt water pipe system that has been dip-coated in Vylastic 'RS' PVC based on Geon 121 PVC paste resin. The ¼" thick coating bonds perfectly to the substrate metal . . . gives seam-free bends which aid flow, reduces turbulence. Dip-coating with Geon PVC eliminates the costly handwork of conventional methods and materials . . . provides immeasureably better resistance to corrosion.



On land and sea Geon is helping to win the battle against corrosion . . . proving itself today's most dependable PVC. You'll find more information about it in Data Booklet 1/54. WRITE FOR YOUR COPY TODAY

Geon is a reg'd trade mark

Both applications featured were carried out by Plastic Coatings Ltd, Guildford By-Pass, Surrey.

British Geon Ltd A COMPANY IN THE DISTILLERS PLASTICS GROUP

Geon

SALES AND TECHNICAL SERVICE DEVONSHIRE HOUSE PICCADILLY LONDON WI HYDE PARK 7321

Distillers Plastics Serve Everyman

COATING AND DIPPING

Articles from pipes to ships' propellers have been coated in pvc paste; other materials used include ptfe and Penton.

On the coated fabrics and sheeting side a trend that will be noticed at the exhibition is that there is a growing tendency to use unsupported calendered pvc instead of the lowest grade of pvc leathercloth. This tendency is making itself felt in applications such as kitchen furniture.

One of the big names in this field, I.C.I. (HYDE) LTD. (Stand C21), is showing a new fashion fabric, Ambla, for the first time. An expanded-coated fabric which has the wearing qualities associated with vinyl, it is very realistically leather-grained. On display are ladies' coats and hats, children's wear, handbags, purses and slip-on shoes. Ambla is at present made in white, freesia, bone and black, and will later be available in other shades. Other exhibits from this company include a number of finished products covered in Vynide, Vynair and Novon, such as jewel cases, chairs, shoes and handbags, suitcases and fancy goods; Novon Ten, a semi-rigid pvc for lamination to steel and non-ferrous metals, and Vynalast, a paper-baked pvc foil.

Cellular Coatings

New on the COMMERCIAL PLASTICS LTD. stand (C64) is Superlon X — pvc with a foam interlock backing. A few months old is Nappatex, a heavy upholstery grade of pvc, which was looked at very closely at this year's Furniture Exhibition. Some new colours have been added to the range and can be seen here for the first time. Metallized unplasticized pvc film is an interesting commercial product aimed at the decoration market.

BERNARD WARDLE (EVERFLEX) LTD. (BB540) is showing Cirrus — a microcellular vinyl, which is said to have a special abrasive resistant finish and good soil retarding properties, coated on to a knit-back fabric. 'Breathable' vinyls are also featured, and a quality product is Everflex Plus — a heavy duty vinyl upholstery built on a broken twill backcloth.

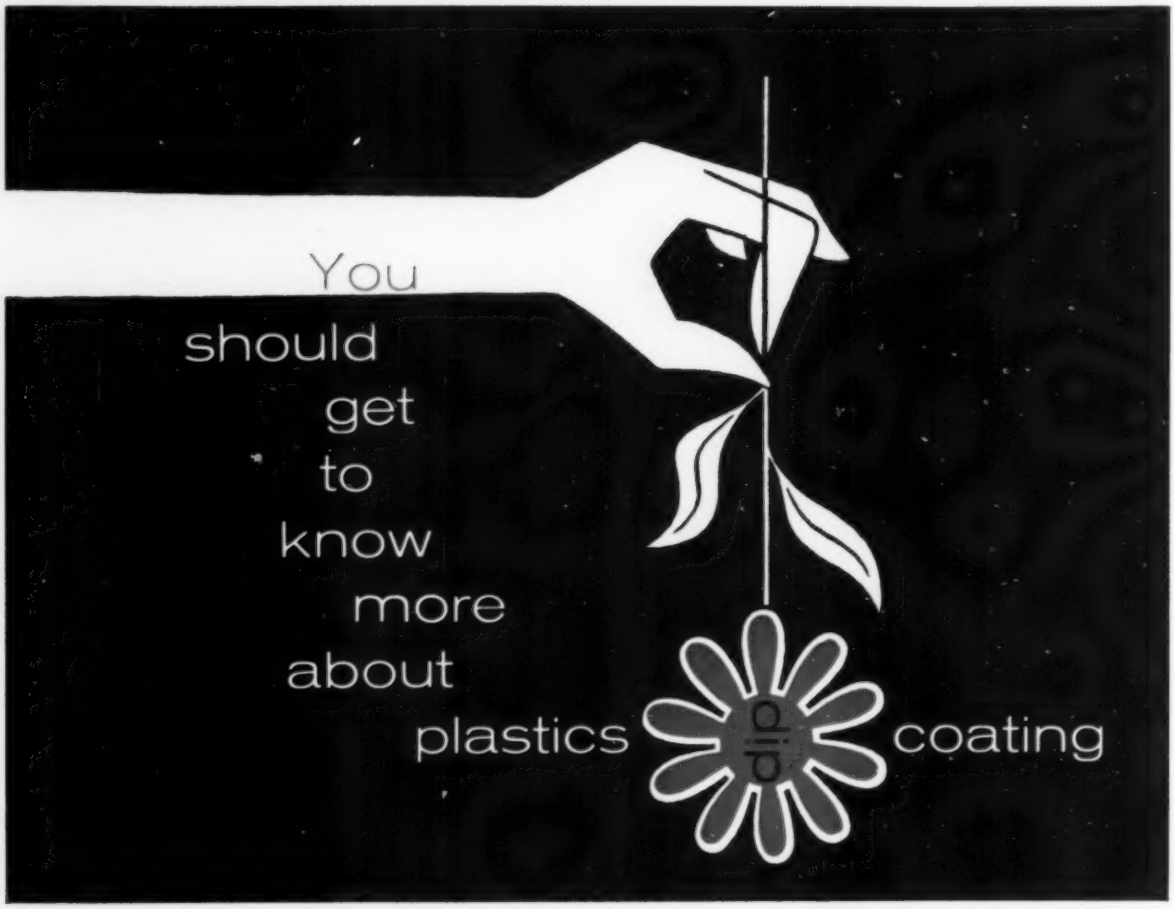
Gloves made by dipping in nitrile latex are on show on BRITISH GEON LTD.'s stand (B216). Technical advice on the dipping process is available on the stand to interested manufacturers. Also to be seen here are examples of coated steel.

LIST OF EXHIBITORS — COATING AND DIPPING

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BERNARD WARDLE (EVERFLEX) LTD. Peblig Mill, Caernarvon.	**BB 540**	**Vinyl-coated fabrics.**
BIRKBYS LTD. Liversedge, Yorks.	**B 222**	**Elo range of resins and moulding powders, including Elo phenolic moulding powders, complying with the different grades of B.S. 771.** These resins are used for bonding, laminating, impregnating, abrasive and friction material applications, insulating and lacquers, and anti-friction resin for fabric bearings.
P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	**B 204**	**Pvc compounds.**
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	**B 216**	**Steel pvc laminates, industrial paints, Hycar gloves.** Water-borne Epok paints have many advantages. Polyester coating on chipboard as a cheaper surfacing material.
DOHM LTD. 167 Victoria Street, S.W.1.	**A 305**	**Dohmpowder fine nylon and polythene.** Prepared for the dip coating or flame spraying of metal. Nylon coatings are noted for high resistance to solvents and oils, and extreme toughness.
FOSFATBOLAGET (STOCKHOLMS SUPERFOSFAT FABRIKS AB) Cardellgatan 1, Stockholm 5, Sweden.	**BB 507**	**Pevikon polyvinyl chloride resins.**
I.C.I. (HYDE) LTD. Hyde, Ches.	**C 21**	**Vynalast, Mural Vynide, Ambla, Novon 10, Vulkide, Vynair, and Hydex.** Fabrics, laminates and other products based on pvc for a wide range of applications.
M AND B PLASTICS LTD. Dagenham, Essex.	**B 207**	**Soreflon ptfe powders and dispersions.** Offered for the first time in the UK.
SCOTT BADER AND CO. LTD. Wollaston, Wellingborough, Northants.	**B 232**	**Deckor pvc pastes.** Pvc plastisols and organosols for dip-coating, spread-coating, rotational casting, etc.
SKANSKA ATTIKFABRIKEN Perstorp, Sweden. Associated with Perstorp Products (Gt. Britain) Ltd. 157 High Street, Orpington, Kent.	**B 225**	**Lacquer resins: Peramin 1262 (urea formaldehyde) and Peramin 3265 (melamine formaldehyde).** Used for stoving and acid-curing lacquers and paints.
JOHN AND E. STURGE LTD. Wheeleys Road, Birmingham, 15.	**BB 518**	**Calofil A4, Calofil B1, Sturcal M:** fillers for pvc pastes which exhibit low viscosity and good ageing properties.
TELCON PLASTICS LTD. Telecon Works, Greenwich, S.E.10.	**B 211**	**Telcothene (polythene), Telcovin (pvc), C.A.B. (cellulose acetate-butyrate) powders and epoxy resin powder.** Newly introduced epoxy thermosetting resin coating powder.
THE NORTH BRITISH RUBBER CO. LTD. P.O. Box 47, Castle Mills, Edinburgh, 3.	**CC 149**	**US Naugahyde — expanded coated vinyl.** For luxury furniture coverings.



It's more than a finish, it's the beginning of a long colourful life of hard-wearing service for metal articles. Whether it's toughness or chemical resistance, or both, that you have in mind, you can now match your coating material to your own special requirements.

Let us send you some further information about

TELCON THERMOPLASTIC POWDERS

TELCON PLASTICS LIMITED
A member of the BICC Group
Farnborough Works, Green Street Green, Orpington, Kent
Telephone: Farnborough (Kent) 55665

COATING AND DIPPING

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

ASSOCIATED ELECTRICAL INDUSTRIES LTD. Crown House, Aldwych, W.C.2.	C 53	**Metrovac Type 27 vacuum-coating unit.** Typical examples of materials with vacuum-coated finish will be displayed.
DOHM LTD. 167 Victoria Street, S.W.1.	A 305	**Dohm bantam dip-coating machine, and ancillary dipping equipment.**
EDLON MACHINERY LTD. New Ruskin House, 28-30 Little Russell Street, W.C.1.	C 19	**Kammann fully-automatic silk-screen printing line, Montoli five-colour fully-automatic offset press, and the Grauel range of offset presses.** These exhibits are being shown for the first time at any British exhibition.
HENRY SIMON LTD. Cheadle Heath, Stockport, Ches.	C 12	**The Simon-Waldron range of web-processing machinery.** Made in England under licence from the Waldron Division of the US Midland-Ross Corporation.
INTERWOOD LTD. 326 Old Street, London, E.C.1.	A 335	**Polyester coating and glue-spreading machines.** LGM polyester and nitro-cellulose lacquer-pouring curtain-coating machine; Klam/M glue spreader and mixer combined (patented); and LAF/GA bench glue spreaders. LAL automatic, motorized strip glueing machine, selo portable. Manual contact adhesive spreader, GL hand glue spreader.
JOHN KIMBELL AND CO. LTD. 4 South Lambeth Road, S.W.8.	A 333	**Zimmer KM 600 coating machine.** A hot-melt roller plastic coating machine being demonstrated in this country for the first time.
MARKMASTER (TRADING) LTD. 39 Victoria Street, S.W.1.	C 49	**Markmaster dry-colour marking, blocking and hot-stamping machines.** The Major, the largest standard machine of its kind in the world, and the unique, and completely automatic, electronically-operated tube-measuring and marking machine will be exhibited for the first time.
MASSON SEELEY AND CO. LTD. 137-139 Euston Road, N.W.1.	BB 539	**Masseeley marking machines.** Model 60, specially designed for marking complete periphery of tubular or circular products.
PHILLIPS BROS. AND ELLIS LTD. 11-13 Charterhouse Buildings, E.C.1.	C 82	**Dry printing equipment.** New range of versatile marking equipment for all types of plastic mouldings and extrusions.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BTR INDUSTRIES LTD. Herga House, Vincent Square, S.W.1.	CC 409	**Sprayed application of pvc as an anti-corrosion medium.**
BRYMOR LTD. The Tannery, East Peckham, Tonbridge, Kent.	BB 509	**Range of pvc-coated fabrics, woven glass, bonded fibres and papers. Examples of commercial proofing, including coating printed materials with clear pvc.** The Brymor range includes Bry-ten which is a thin, flexible, coated Kraft paper used for all types of covering work.
I.C.I. (HYDE) LTD. Hyde, Ches.	C 21	**Coated fabrics and metals.** Ambla is the newest fashion fabric which handles and looks like leather. Vynalast paper-backed pvc foil is used for lamination to non-metallic surfaces.
METAL BOX CO. LTD. (THE) Plastics Group, 37 Baker Street, W.1.	B 206	**Metathene polythene-coated cellulose film.** Metacote polyvinyledene chloride-coated materials.
PLASINTER LTD. Progress Works, Holyhead Road, Wednesbury, Staffs.	C 28	**Coated specimens representing a cross-section of industrial applications and showing the complete range of Plasinter's coatings.** Main coatings featured will be the new, reformulated pvc dispersions MM/AD, MS/HC and MS/AD.
PLASTIC COATINGS LTD. Woodbridge Industrial Estate, The By-Pass, Guildford, Surrey.	C 10	**Articles coated in pvc, polythene, nylon, pfte, ptfce and Penton.** Articles can be coated up to five tons in weight and 17ft. × 7ft. × 7ft. in size.
VINATEX LTD. Carshalton, Surrey.	B 217	**Coated articles made using Vinatex pvc pastes and Vinacoat pvc sintering powder.** These include glass aerosol bottles, tool handles and wire-work objects.
VMC LTD. 73 Oakfield road, Penge, S.E.20.	C 2	**Vacuum-coated mouldings.** These include three-dimensional badges and other decorated objects.
WHIFFEN AND SONS LTD. Willows Works, Derby Road, Loughborough, Leics.	BB 525	**Ralsin-coated metal furniture.** Chairs, deck fittings, etc. New products on display.

THIS Tri-ang Regd. Trade Mark WINNER

...out of **Geon**

...by rotational casting

Today's toymaking trend favours rotational casting . . . and Geon PVC. It requires no elaborate equipment; permits a fast production cycle; enables manufacturers to choose the best plastics materials and use them economically. By rotational casting with Geon PVC, Lines Brothers (Ireland) Ltd, and other toy manufacturers, design and get greater detail into rigid and flexible toys—from rocking horses to the softest dolls. Geon PVC ensures that they retain their toughness, colour and imperishable good looks through many years of nursery life.

For information about Geon PVC
please write for Data Booklet No. 1/54

Geon is a reg'd. trade mark

'Safety Major' rocking horse is one of four now made with rotational casting of rigid Geon PVC by Lines Brothers (Ireland) Ltd.

GEON AT OLYMPIA
Visitors to the Interplas Exhibition are invited to see Geon achievements and discuss Geon possibilities
on STAND B216

British Geon Ltd A COMPANY IN THE DISTILLERS PLASTICS GROUP

Geon

SALES AND TECHNICAL SERVICE DEVONSHIRE HOUSE PICCADILLY LONDON W1 HYDE PARK 7321

Distillers Plastics Serve Everyman

Casting

MACHINERY

IN rotary casting work it is often possible to use comparatively inexpensive moulds instead of expensive hardened steel types. Aluminium and Kirksite moulds are therefore very popular, and G. PERRY AND SONS LTD. (Stand C16) are demonstrating their pattern-making services.

A rotational casting machine can be seen on Stand A323 where it forms part of the exhibit of the LONDON AND SCANDINAVIAN METALLURGICAL CO. LTD. who are giving demonstrations during the exhibition showing the manufacture of cast articles for the upholstery trade and for display purposes. INTERNATIONAL CORPORATION LTD. (Stand A322) is showing the Alquist centrifugal casting machine which is a laboratory type machine used for the production of sheet sections in a variety of materials including polythene, pvc and polyester. Standard drum sizes are from 31½-39½in. diameter but drums can be made to customers' requirements.

No special machinery is needed for the production of castings from liquid polyester or epoxy resins, other than some kind of mould into which the resin can be poured — gravity doing the rest.

It is sometimes necessary, especially with more viscous materials, to take steps to eliminate air bubbles in the finished casting and this is normally done with the aid of a vacuum chamber of some kind, and a standard vacuum pump. The chamber can be provided with some means of introducing the resin into the mould while the latter is subjected to a vacuum.

PRODUCTS and MATERIALS

THE term casting when applied to fabrication with plastics materials can be used to apply to two distinct processes. The first of these — more commonly referred to as rotary casting or slush moulding — is used for the production of hollow articles from pvc pastes or plastisols. The liquid polymer is poured into a mould where it is caused to cure on the mould surfaces either by the use of a hot mould — the uncured material being poured out after a predetermined time — or by rotation of the mould, when the liquid is driven by centrifugal force on to the mould surfaces. The displays on a number of stands are wholly or partially devoted to materials and machines for casting and to cast products.

FARBWERKE HOECHST AG (Stand B219) are displaying their range of Hostalit P pvc paste polymers suitable for coating dipping and rotational casting and similar materials are also shown by SCOTT BADER AND CO. LTD. (Stand B232) whose Dekor pvc plastisols and organosols are widely used. PECHINEY-SAINT GOBAIN (Stand BB534) also include pvc and vinyl compounds in their display as do P. B. COW (PLASTICS) LTD. (Stand B204).

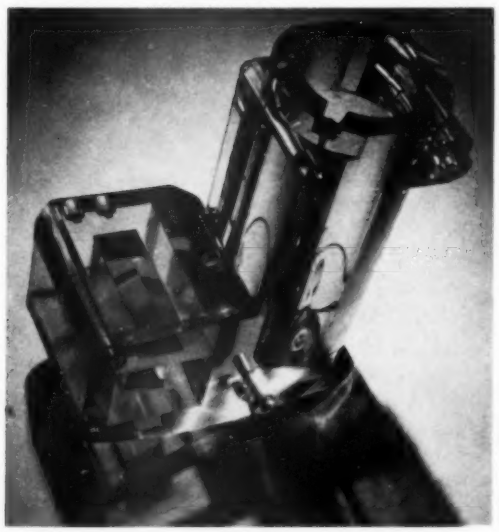


Fig. 17. This intricate electrical component for a high voltage pulse transformer is cast from Araldite epoxy resin

The second method of casting makes use of liquid polyester or epoxy resins. Perhaps one of the largest users of these materials for this purpose is the electronics industry where use is made of their good electrical properties for the potting and encapsulation of components.

The constant trend towards miniaturization is partially responsible for the increased use of potted components and the advent of guided weapons has also had some effect. Guided weapons and space vehicles involving complex electronic equipment must operate in extreme conditions of temperature and humidity and the failure of one small component due to environmental conditions could cause total breakdown of the electronics in a unit costing many thousands of pounds.

Resin Manufacturers

Many manufacturers of polyester and epoxy resins are exhibiting and although most of them are stressing the use of their resins in the reinforced plastics field, many of these materials are entirely satisfactory for casting applications.

CIBA (ARL.) LTD. (Stand CC435) are showing a wide range of synthetic resin products and specimens showing many applications of them. Araldite epoxy resins are available in many different forms and examples of electrical applications include high voltage insulators, bushings, and impregnated and potted transformers. (An interesting example of an intricate casting is shown in Fig. 17.) Also on show are Araldite faced press tools and cast foundry patterns.

Epoxy resin castings are also featured on the stand of PERMALI LTD. (Stand C414) where the applications shown include electrical insulation and electronic equipment, consumer products and railway engineering.

Other resin manufacturers include SHELL CHEMICAL CO. LTD. (Stand B218) showing Epikote resins, BRITISH INDUSTRIAL PLASTICS LTD., manufacturers of Beetle resins, ARTRITE RESINS LTD. (Stand CC430) whose display includes the recently introduced PE90 fast hardening polyesters which need no curing, BECK KOLLER AND CO. LTD. (Stand B217), SCOTT BADER AND CO. LTD. (Stand B232), BAKELITE LTD. (Stand C38) and A. BOAKE ROBERTS AND CO. LTD. (Stand C25).

CASTING

LIST OF EXHIBITORS — CASTING

Materials

(The first column gives the exhibitor, the second the stand number, the third the pincipral exhibits only)

CIBA (ARL) LTD. Duxford, Cambs.	CC 434	**Araldite epoxy resins.** Examples of applications in the electrical and other industries.
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, S.W.1.	B 216	**Geon pvc pastes.** For rotary casting and flush moulding.
FARBWERKE HOECHST AG. Frankfurt Main, Western Germany. UK Representatives: Hoechst Chemicals Ltd. 50 Jermyn Street, S.W.1.	B 219	**Hostalit P (pvc paste polymer).**
JOHN AND E. STURGE LTD. Wheeleys Road, Birmingham, 15.	BB 518	**Calofil A4, Calofil B1, Sturcal M.** White, high-quality fillers which give pastes with good ageing properties and good flow properties because of their low oil absorption.
PECHINEY-SAINT GOBAIN Agents: K. W. Chemicals Ltd. Caroline House, 55-57 High Holborn, W.C.1.	BB 534	**Pvc compounds and vinyl compounds.**
SCOTT BADER AND CO. LTD. Wollaston, Wellingborough, Northants.	B 232	**Deckor pvc pastes.** Pvc plastisols and organosols for dip-coating, spread coating and rotational casting.

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

INTERNATIONAL CORPORATION LTD. 1 Cornwall Road, S.E.1.	A 322	**Alquist centrifugal casting machine.**
LONDON AND SCANDINAVIAN METALLURGICAL CO. LTD. Wellington Works, Wellington Road, S.W.19.	A 323	**Rotational casting machine.** Demonstrations will be given showing the manufacture of articles for the upholstery and display industry.
G. PERRY AND SONS LTD. Hall Lane, Aylestone, Leics.	C 16	**Machined aluminium and kirksite moulds.** Pattern-making services will be available.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	B 204	**Pvc products.**

Compression Moulding

MACHINERY

IN spite of the tremendous developments in the field of injection moulding machines, compression presses continue to remain supreme in the thermosetting industry. Even transfer presses do not seem to have made the headway expected of them at one time. As with many aspects of the plastics industry, there is no change in the basic concept of compression moulding, but more and more automation is introduced. This tendency is well represented at Interplas 61.

FAWCETT PRESTON AND CO. LTD. (Stand C88) will be demonstrating their 100-ton down-stroking compression press having semi-automatic control with push-button operation to give one complete fast cycle (see Figure 18). Hydraulic power is conserved by means of automatic pre-filling valves for fast approach. This will be a working exhibit with demonstrations at intervals each day.

FOSTER YATES AND THOM LTD. (Stand C56) will be exhibiting their well-known 'Lancastrian' transfer moulding press for thermosetting plastics and rubber having 30in. square platens with independent temperature controls. There is a 400-ton main down-stroking ram with an up-stroking transfer ram, which is infinitely variable from 5 tons to 50 tons, and which is also infinitely variable as far as rate is concerned. The transfer action is smooth and the machine is fitted with top and bottom ejection. An interesting feature is the dual capacity. It has been designed to allow conversion to injection moulding by means of suitable pads and controls, so that a Foster-Wucher preplasticizing unit can be worked in conjunction with the machine.

COMPRESSION MOULDING

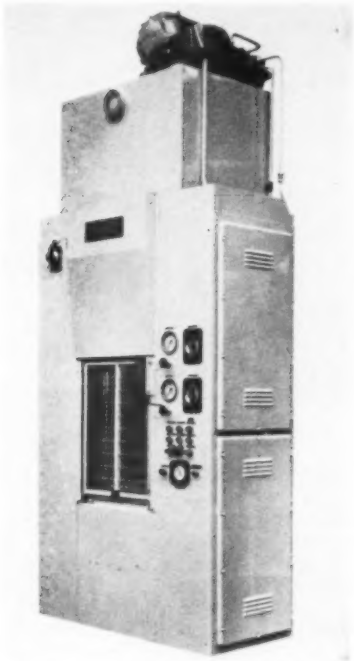


Fig. 18. Fawcett down-stroking 100-ton compression-moulding press

T. H. AND J. DANIELS LTD. (Stand A326) will be exhibiting an advanced design of transfer/compression moulding press. The controls of such presses have often been inconveniently and haphazardly located for years. Now Daniels have built the controls into a

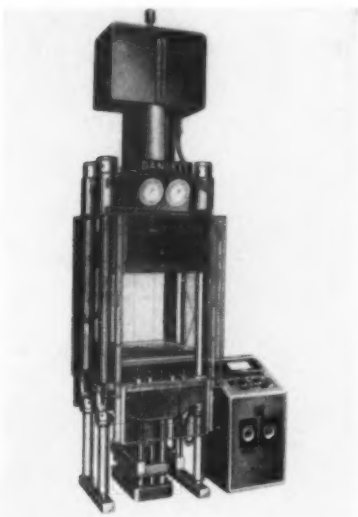


Fig. 19. Daniels 100 28-ton type C transfer press

separate console coupled to the press by a flexible conduit (see Figure 19). This not only means that it can be located in any convenient position, but that the daylight is left quite clear for moulds having auxiliary hydraulic cylinders for core operation. The hydraulic circuit is completely redesigned, giving rapid approach and opening speeds, with controlled closing and automatic breathing and dwell cycles. Consequently, it is quite suitable for use with all materials including alkyds and dough-moulding compounds. The platens are 20in. square with a daylight of 20in. and a stroke of 16in. As exhibited, the press has a fixed mesh guard at the back and sides and a hand-operated front screen, the closing of which actuates the semi-automatic operation. The usual wide range of other presses will be on show.

BRADLEY AND TURTON LTD. (Stand C18) will be exhibiting their No. 936/150-ton self-contained down-stroking hydraulic press with a push-button two-stage process controller. It is suitable for the 'Overlay' method of moulding designs.

Battery Box Press

FRANCIS SHAW AND CO. LTD. (Stand C62) will have a battery box press on show for the first time in the UK, and BATTENFELD (ENGLAND) LTD. (Stand C44) will have compression moulding machinery on show made by Battenfeld Maschinenfabriken GmbH.

INTERWOOD LTD. (Stand A335) will be exhibiting the HEP all-electric hydraulic multi-platen press and the FHU/FSH single-opening hydraulic press for fixing melamine laminates to panels.

Ancillary Equipment

It is an encouraging trend to see ancillary equipment given so much attention in all branches of the plastics industry. Compression moulding is no exception and includes pelleting machines, pre-heaters, control systems, hydraulic systems, and so on. One interesting feature by Bradley and Turton Ltd. is their No. 336 100-ton D/S machine illustrating how push-button control may be added to existing presses. The same company is exhibiting central pump units with a new central supply system, quite complete. Fawcett Preston and Co. Ltd. in a similar field are exhibiting a Greer-Mercier hydro-pneumatic accumulator, revealing rubber bag and poppet valve.

Pelleting Machine

T. H. and J. Daniels Ltd. are exhibiting their 40-ton pelleting machine. Since it is hydraulically operated it is able to handle powders which are unsuitable for use with mechanical types of pelleters. This is quite an important feature and may well eliminate weight variations in preforms. The machine has its own hydraulic equipment and provision has been made to support core pins so that ring tablets may be produced. An area of 4¼in. has been made available for the forming punches.

MILLS COMMERCIAL SUPPLIES LTD. (Stand A312) will be exhibiting electromagnetic press tools demonstrating automatic feed for use in banks, processed timed.

Preheaters

RADYNE LTD. (Stand A330) will be exhibiting their standard range of preheaters with power outputs from 1kW to 12kW. However, stress will be on the Radyne H.100, the first of a range of premium quality pre-heaters with extremely rapid action (see Figure 20). To achieve the remarkable results claimed, a number of important innovations have been introduced. To obtain best results, the pellets must be pre-heated at just the right moment, which is perhaps when the moulding press is opening. A means has therefore been provided whereby the heater can be started from the press. For rapid unloading the pre-heater lid and electrode lift fast and clear of the load to give first-class access. Heating can be achieved in 10-15sec., and although the heater is rated at 10kW. its efficiency

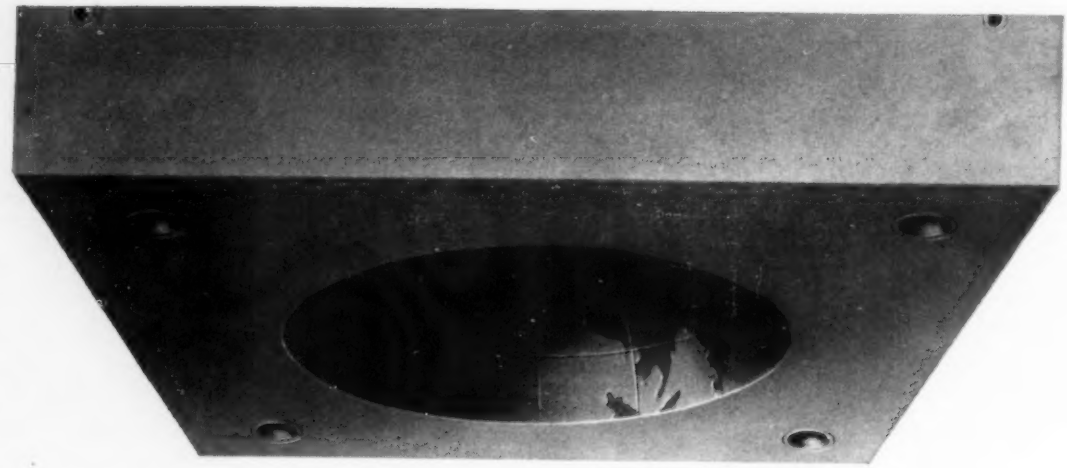
Fig. 20. Radyne H.100 plastic preheater

is so high that it consumes little more power than a conventional 5kW. heater. In order to ensure that loads which may heat up a little faster cannot over-heat or pre-cure, both the conventional and peak current trip methods of timing the heating cycle are provided. Both plastics and rubber can be pre-heated by this means, and it is claimed that cure times can be reduced by as much as 10:1 and that far more consistent load temperatures are obtained.

Flash Removal

BEANWY ELECTRIC LTD. (Stand C87) are exhibiting their 'Cycler' pellet preheaters for circular and non-circular pellets in all materials. They will also have on show induction heated platens for use up to 300°C and for alternate heating and cooling cycles.

Satisfactory and cheap removal of flash has always been a problem in the plastics industry. The Guyrota automatic blast cleaning machine, which



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Distillers Plastics Serve Everyman

COMPRESSION MOULDING

will be demonstrated is thus of particular interest (see Figure 21). It is made by GUYSON INDUSTRIAL EQUIPMENT LTD. (Stand A325) and is designed to tumble large quantities of small mouldings under an abrasive stream of 'soft blast' granules. The process is semi-automatic and a motorized rotating basket in the cabin tumbles the parts at low speed while bombardment proceeds. Since each side of the component is presented to the stream then the reaction is rapid. It is suitable for intricate mouldings and interested visitors are invited to bring along small batches of mouldings for treatment in the demonstration machine.

Fig. 21. Model SBP 40 Guyson de-flashing machine

PRODUCTS and MATERIALS

MENTION compression moulding — in terms of moulding powder, machinery and finished products — and the name that probably comes to mind is BRITISH INDUSTRIAL PLASTICS. It is likely that this company is the only 'vertically organized' one in the plastics industry; it can provide everything, including machinery, from the raw material to the finished product. On separate stands (but only a step or two apart) are BIP CHEMICALS (C35), BIP ENGINEERING LTD. (C55) and BIP TOOLS LTD. (C42). On the first stand is a well-chosen selection of mouldings in Beetle, Scarab and Melmex powders, while BIP Tools is showing compression moulds and a selection of mould parts to illustrate the services the company offers to the smaller mould maker. These relate to cold hobbing, liquid hobbing of beryllium copper (a completely new service), thread milling, thread grinding and mains frequency induction heating installations (Figure 22).

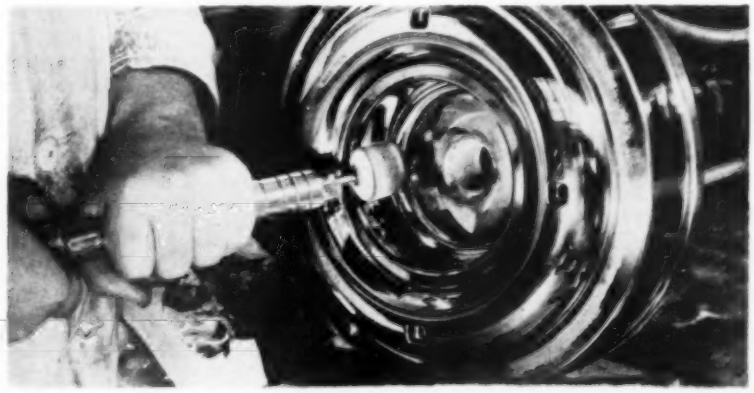


Fig. 22.—Mould being finished at BIP Tools Ltd. Besides moulds, this company is exhibiting mould parts which can be supplied to the smaller mould maker

Some very interesting compression moulded articles can be found on the stand (B215) of BRITISH CELANESE LTD. These have been made by Courtaulds Engineering Division, and include a reel, in section, used for the continuous spinning of viscose high tenacity yarn, and the plastic is combined with high precision ground metal components and bearings. There is also a section of a trough about 3ft. long by 5in. square section moulded in Durestos RA3 material for carrying sulphuric acid around boiling point.

Compression mouldings demonstrating the finish achieved by careful tool construction, handling and inspection are present on Stand BB526. Here, UNITED EBONITE AND LORIVAL LTD is showing parts for industrial electrical switchgear, car electrical parts and units for consumer goods, such as gyrators for washing machines.

Phenolics on the STERLING MOULDING MATERIALS LTD. (Stand B223) include general-purpose and special grades. Among the latter are grades resistant to shock, heat, water, acid and alkali, and also high-dielectric and telephone-quality grades. The company produce phenolics by the Canusa process.

LIST OF EXHIBITORS — COMPRESSION MOULDING

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BIP CHEMICALS LTD. Oldbury, near Birmingham, War.	C 35	**Beetle scarab and Melmex moulding powders.** Beetle DMC polyester dough-moulding compounds.
BIRKBYS LTD. Liversedge, Yorks.	B 222	**Elo range of resins and moulding powders includes Elo phenolic moulding powders complying with the different grades of B.S. 771.** Used for bonding, laminating, impregnating, abrasive, and friction material applications, insulating varnishes, cements and lacquers, and anti-friction resin for fabric bearings.
BRITISH OXYGEN CHEMICALS LTD. 24 Grafton Street, W.1.	CC 411	**Tableware moulded in melamine.** The company manufactures melamine crystal only, and is featuring both coloured and decorated tableware moulded in melamine.

COMPRESSION MOULDING

P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	B 204	**Pvc compounds.**
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	B 216	**Dough-moulding compounds and polyester glass materials.**
FARBWERKE HOECHST AG. Frankfurt Main, Western Germany. UK Representatives: Hoechst Chemicals Ltd. 50 Jermyn Street, S.W.1.	B 219	**Hostalen G (high-density polythene), Hostalit Z (pvc chlorinated polyolefine), Hostalen PP (polypropylene), and Hostaflon C2 (ptfce).** Grade GUR of Hostalen G is a high-molecular-weight material, suited for sealants, gaskets, textile pickers, etc.
RESINOUS CHEMICALS LTD. Blaydon-on-Tyne, Co. Durham.	BB 543	**AMC range of alkyd moulding compounds.** AMC 420 PX 1033 is a new improved impact-strength granular grade.
STERLING MOULDING MATERIALS LTD. Sterling House, Heddon Street, W.1.	B 223	**Phenolic moulding materials; phenol and cresol resins.**
JOHN AND E. STURGE LTD. Wheeleys Road, Birmingham, 15.	BB 518	**Calofort S.** A high-quality filler for use in compression moulding compounds where it enhances the basic whiteness of pvc.
TURNER BROTHERS ASBESTOS CO. LTD. P.O. Box 40, Rochdale, Lancs.	CC 408	**Durestos resinated asbestos moulding materials.**

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BATTENFELD MASCHINENFABRIKEN GmbH Agents: Battenfeld (England) Ltd. Great South-West Road, Bedfont, Feltham, Middx.	C 44	**Fully automatic BRP4 multipress machine.**
BEANWY ELECTRIC LTD. Bushey Lane, Tyseley, Birmingham, 11.	C 87	**Induction-heated platens. Cycler pellet preheaters.** Platens are for use up to 300 C. and for alternate heating and cooling cycles.
BIP ENGINEERING LTD. Streetly Works, Aldridge Road, Sutton Coldfield, War.	C 55	**Bipel 20-, 80- and 150-ton fully-automatic compression presses.** Also shown will be Bipel 35- and 70-ton horizontal hydraulic pelleter machines.
BIP TOOLS LTD. 147 Tyburn Road, Erdington, Birmingham, 24.	C 42	**A variety of complete moulds including compression.** Mould parts to show services given to small mouldmaker. Also on display will be small exhibits featuring liquid hobbing of beryllium copper.
BRADLEY AND TURTON LTD. Caldwall Works, Kidderminster, Worcs.	C 18	**No. 936 150-ton self-contained hydraulic press. No. 336 100-ton D/S machine. Central pump units.** Suitable for the Overlay method of moulding designs.
T. H. AND J. DANIELS LTD. Lightpill Iron Works, Stroud, Glos.	A 326	**100 28-ton transfer or compression-moulding press.** 40-ton pelleting machine.
FRANCIS SHAW AND CO. LTD. Corbett Street, Ashton New Road, Manchester, 11.	C 62	**Battery box press.** On show for first time in UK.
GUYSON INDUSTRIAL EQUIPMENT LTD. North Avenue, Otley, Yorks.	A 325	**Deflashing equipment and matt-finishing equipment.** SBP 40 for individual treatment of mouldings, T 40 Guyrota for flash removal from large numbers of small mouldings.
INTERWOOD LTD. 326 Old Street, E.C.1.	A 335	**Plastic cutting shears. HEP all-electric hydraulic multi-platen press.** FHU FSH single-opening hydraulic press for affixing melamine laminates for panels.
MARKMASTER (TRADING) LTD. 39 Victoria Street, S.W.1.	C 49	**Markmaster dry-colour marking, blocking and hot-stamping machines.** The Major, the largest standard machine of its kind in the world, and the unique, and completely automatic, electronically-operated tube-measuring and marking machine will be exhibited for the first time.
MILLS COMMERCIAL SUPPLIES LTD. 241a High Street, Acton, W.3.	A 312	**Electromagnetic press tool.** Automatic feed — for use in banks, process timed — seen for first time.
G. PERRY AND SONS LTD. Hall Lane, Aylestone, Leicester.	C 16	**Machined, aluminium and kirksite moulds.** Pattern-making services available.
RADYNE LTD. Eastheath Avenue, Wokingham, Berks.	A 330	**A range of high-frequency plastic pre-heating equipments for the moulding industry.** Model H.100, a new high-speed pre-heater of 10kW. performance and operating at a frequency of 80mc/s., will be shown. It is the first unit ever to be designed for rubber pre-heating.

COMPRESSION MOULDING

F. J. STOKES LTD.
Mercury House,
Hanger Green, W.5.
A 234 **Fully-automatic compression-moulding presses.** Model 800 is now being produced in the UK.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

ASSOCIATED ELECTRICAL INDUSTRIES LTD.
Crown House, Aldwych, W.C.2.
CC 415 **Range of compression mouldings.** Telephone mouldings, domestic appliance parts and electrical components.

BARCLAY STUART (PLASTICS) LTD.
25-27 Brunswick Street,
Luton, Beds.
C 106 **Components for the aircraft and radio industries, motor cars, lorry and other transports.** Electrical and other industrial moulding.

BIRKBYS LTD.
Liversedge, Yorks.
B 222 **Elo technical mouldings in all types of thermosetting materials.**

CHAS. LOWE AND CO. (MANCHESTER) LTD.
Phoenix Chemical Works, Harrogate Road,
Reddish, Stockport, Ches.
B 205 **Industrial articles made from phenolic resins.** A wide range of phenolic resins is available.

CRYSTALATE (MOULDINGS) LTD.
Crystalate House, Mill Lane,
Tonbridge, Kent.
CC 417 **Trade mouldings in a wide range of thermosetting materials.** The range will include articles in Araldite GL.125 and polyester dough moulding compound.

EKCO PLASTICS LTD.
Ekco Works, Southend-on-Sea, Essex.
C 67 **Mouldings for wide variety of industries.** Also Ekco Gold Seal domestic products and toilet seats.

FOSFATBOLAGET (STOCKHOLMS SUPERFOSFAT FABRIKS AB)
Cardellgatan 1,
Stockholm 5, Sweden.
BB 507 **Mepal melamine-moulding compounds.**

INSULATORS LTD.
Leopold Road, Edmonton, N.18.
C 22 **General custom mouldings for electrical industry.**

LONDON MOULDERS (PLASTICS) LTD.
Buckingham Road, Trading Estate,
Slough, Bucks.
B 204 **Range of industrial mouldings.**

METROPOLITAN PLASTICS LTD.
Faraday Way, St. Mary Cray,
Orpington, Kent.
C 50 **Mouldings in all thermosetting materials and moulding tools.**

NATIONAL PLASTICS LTD.
Avenue Works,
Walthamstow Avenue, E.4.
C 24 **Trade mouldings** used for domestic appliances, radio, automobile industry, etc.

ORNAMIN (UK) LTD.
78-90 Clarke Road,
Northampton.
BB 546 **Compression mouldings decorated by the Ornamin process.** Industrial items include knobs, dials and nameplates; dinnerware, and advertising articles.

PATENT PULP MANUFACTURING CO. LTD.
Mill Lane, Thetford, Norfolk.
CC 426 **Moulded resin-bonded pulp articles.**

PRESTFIBRE LTD.
Spencers Wood,
Reading, Berks.
BB 541 **Moulded chairs, prefabricated ducting for walls and floors, car fascia panels and gear-box covers, containers and cases of various sizes.** Lightweight nesting chairs supplied in a paint finish for outdoor use or upholstered for use indoors.

THE PRESTWARE GROUP
(Prestware Ltd., Lustroid Ltd., P.L. Display Co. Ltd.)
Southdown Works, Kingston Road,
Raynes Park, S.W.20.
C 9 **Mouldings in urea, phenolics and melamine.**

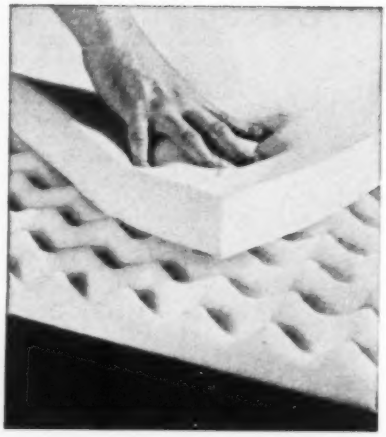
STREETLY MANUFACTURING CO. LTD.
Streetly Works,
Sutton Coldfield, War.
B 230 **Range of mouldings in thermosetting materials.** These include Vent Axia fan mouldings and Melmex melamine tableware.

THERM-PLAST LTD.
Rushey Lane, Tyseley,
Birmingham, 11.
C 87 **Trade mouldings and flower pots.**

TUFNOL LTD.
Perry Bar,
Birmingham, 22b.
C 37 **Tufnol sheets, tubes, rods, angles and channels in various brands to suit specific requirements.** Bear brand Tufnol used for bearings on 45,000-ton P. & O. liner *Canberra*.

UNITED EBONITE AND LORIVAL LTD.
Little Lever, near Bolton, Lancs.
BB 526 **Starter-battery container, washing-machine agitator.** Latest example in the Lorival lightweight container range.

Sitting on air!



Geon at Olympia

Visitors to the Interplas Exhibition are invited to see Geon achievements and discuss Geon possibilities

on Stand B216

Furniture in modern homes,
seats in today's cars,
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can all be given everlasting,
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This versatile material
is easily converted into
two important furniture products—
vinyl foam for cushioning;
sheeting or leathercloth for upholstery.
Combine the two by R.F. welding
and the perfect bond of
Geon-and-Geon ensures
non-flammable, resilient seating
which is easily kept clean.
Geon PVC is strong,
will not rot or perish,
and is hard to damage.
Specify Geon PVC for
cushioning and upholstery—
and put bounce into your sales!

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Geon

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Distillers Plastics Serve Everyman

Foam and Expanded Materials

MACHINERY

MANY users of pvc, polyurethane and other foams are now using plastic welding equipment. Such foams can often be welded and even tear-seal welded with HF equipment. HF INDUSTRIAL SERVICES LTD. (Stand A332) are demonstrating their Acme range of plastics welding equipment for such purposes. Further details are given in the Fabrication from Sheet section.

THE BAXENDEN CHEMICAL CO. LTD. (Stand BB524) will be showing a range of machines for dispersing and spraying polyurethane and other foams, products which they themselves manufacture and will show. The machines concerned are those for producing rigid polyurethane foams including those blown by Freon; the Hydra-Cat equipment manufactured by Gray Company Incorporated of Minneapolis developed to handle the airless atomization of urethane foam systems, epoxy surface coating systems and polyester resin/glass fibre systems; air spray equipment by Aerograph DeVilbiss and the Newton Mixing Machine for dispersing either flexible or rigid foam.

PRODUCTS AND MATERIALS

THERE has been much publicity about the advent of plastics into the building field, and a recent series of articles (*RPW* April 29) shows the importance of foams and expanded materials in this market. Confidence in its own products has been shown by SHELL CHEMICAL LTD. (Stand B218) which has made extensive use of its Styrocell expanded polystyrene in its new South Bank building. Thin boards of the material have been used as a thermal insulant in ceilings, on air-conditioning ducting and on chilled drinking-water pipes. Various applications of the foam can be seen on the stand. Another big manufacturer of foamed polystyrene is MONSANTO CHEMICAL CO. LTD. (Stand C34), while I.C.I. DYESTUFFS DIVISION (Stand CC420) is exhibiting applications of its polyurethane chemicals in rigid, semi-rigid and flexible foams, surface and fabric coatings, hard and soft rubbers, and also polymeric plasticizers and pigments for plastics. The emphasis is on flexible foams, which are illustrated by the new foambacks for women's wear and by carpet underlays and upholstery. Pipe lagging and roof insulation are among the applications shown to illustrate the use of rigid foams.

Foamed vinyl leathercloth has made a considerable impact on the garment trade this year, but until recently this new fashion material has been imported, some from Germany, but mainly from America. Now British manufacturers have developed products that compare favourably with the imported fabric, and the possibilities open to manufacturers using the new material are featured on the BRITISH GEON stand (B216), which provides the raw material (pvc) for it. Fabricators are STOREY BROS. (Stand C68) and BERNARD WARDLE (Stand BB540).

This new product has a microcellular structure produced by a blowing process, and is coated directly on to a fabric base. A protective coating, also of pvc, gives added abrasion resistance.

Applications include women's coats, men's jackets, belts, handbags and slippers.

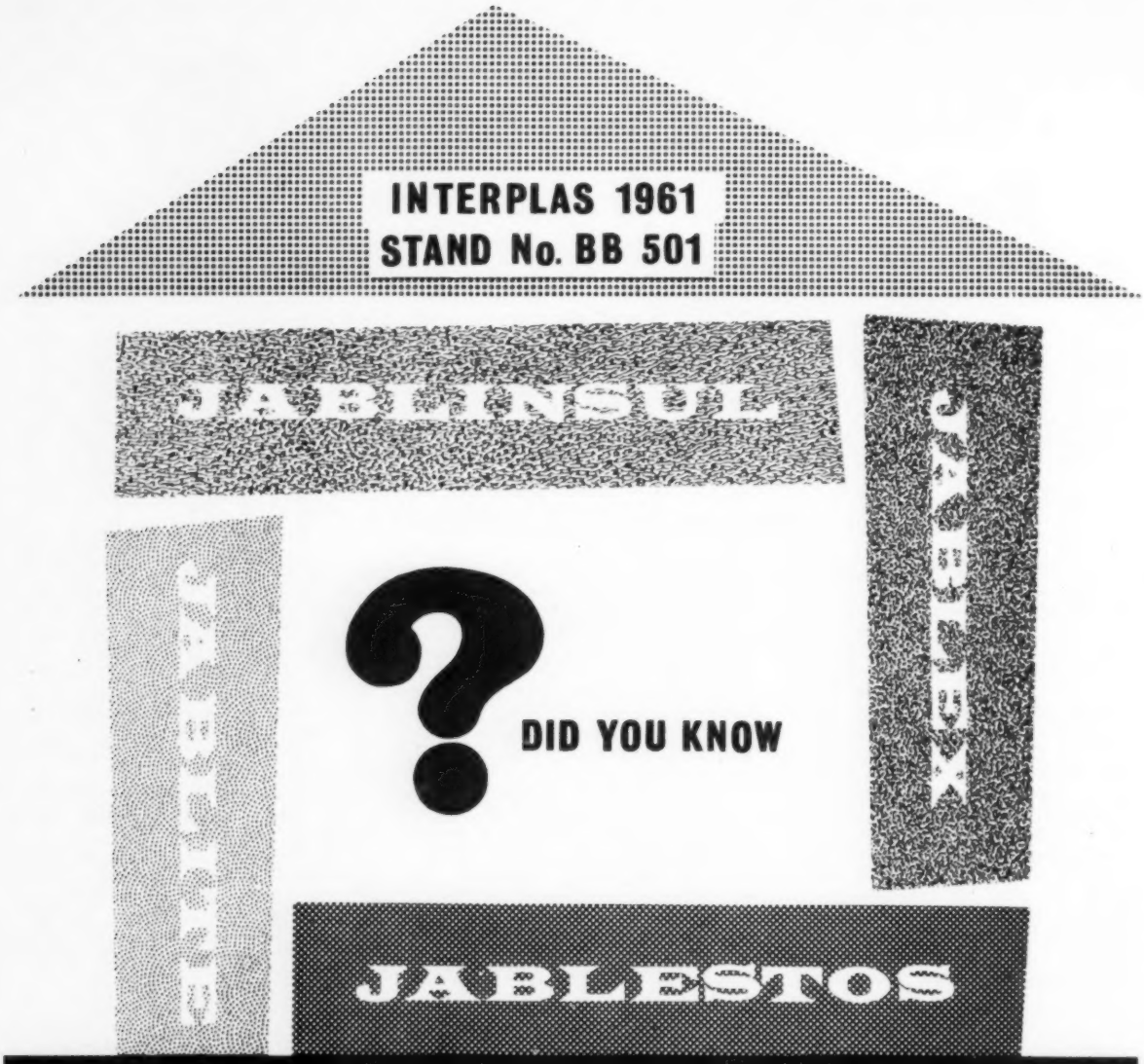
'Foamed fabrics' can also be seen on Stand B213, where LINTAFOAM LTD. is showing autumn and winter fashions made from Lintafoam backed materials. Here there are warm overcoats that 'weigh no more than half a dozen eggs'.

LIST OF EXHIBITORS — FOAM AND EXPANDED MATERIALS

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

THE DISTILLERS CO. LTD. CHEMICAL DIVISION Devonshire House, Mayfair Place, Piccadilly, W.1.	**CC 429**	**Bisoflex butyl benzyl phthalate.** New plasticizer for flooring and foamed pvc.
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	**B 216**	**Pvc foams and materials will be displayed.**
I.C.I. DYESTUFFS DIVISION Woburn Lodge, Upper Park Road, Salford, Manchester, Lancs.	**CC 420**	**Isocyanates, polyethers and polyesters.** For the production of rigid and flexible foams.
FOSFATBOLAGET (STOCKHOLMS SUPERFOSFAT FABRIKS AB) Cardellgatan 1, Stockholm 5, Sweden.	**BB 507**	**Pevikon polyvinyl chloride resins.**
IMPERIAL CHEMICAL INDUSTRIES LTD. Plastics Division, Millbank, S.W.1.	**C 66**	**Polyurethane foams.** I.C.I. plastics in building is the theme of the exhibit, foams will be shown in their role as insulants.
MONSANTO CHEMICALS LTD. 10-18 Victoria Street, S.W.1.	**C 34**	**Montopore.** Foamable polystyrene beads.
PRITEX (PLASTICS) LTD. Wellington, Somerset.	**C 75**	**Polyether and polyester polyurethane foams.** The range of 11 polyurethane foams will be on view which are available both in the slab and in fabricated units. The latest one-shot polyethers will be on show for the first time.



JABLO plastics provide insulation for every part of the building

JABLITE The original and most widely known version of expanded polystyrene in the U.K. In universal use as an insulant in the building, refrigeration and transport industries.

JABLESTOS Insulated composite building boards for curtain walling and interior partitions.

JABLEX Expanded P.V.C., rigid and flexible grades.

JABLINSUL In situ foam plastic for cavity filling and insulation of awkwardly placed piping and ducts.

JABLO PRODUCTS APPROVED AND ADOPTED BY ALL MINISTRIES, ADMIRALTY, WAR DEPARTMENT AND GOVERNMENT ESTABLISHMENTS

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Telephone CRO 2201

FOAM AND EXPANDED MATERIALS

SHELL CHEMICAL CO. LTD. Old Burlington Street, W.1.	**B 218**	**Polyurethane foams.** Raw materials for the manufacture of foams.
JOHN AND E. STURGE LTD. Wheeleys Road, Birmingham, 15.	**BB 518**	**Calofil A4, Calofil B1, Calofil E2, Sturcal M, Caloxol C31.** Low-oil-absorption fillers which do not cause undue increase in viscosity which would hinder foaming. Caloxol is a desiccant.
WHIFFEN AND SONS LTD. Willows Works, Derby Road, Loughborough, Leics.	**BB 525**	**Genitron blowing agents.** Used in the production of foams of many kinds.

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

THE BAXENDEN CHEMICAL CO. LTD. Paragon Works, Baxenden, near Accrington, Lancs.	**BB 524**	**Machines for dispensing and spraying polyurethane foams, Spandoplast, Spandofoam, Clocel P.E.2, Celspray.** The Hydra-Cat equipment is new and handles the airless atomization of urethane foam systems and polyester resin/glass-fibre systems.
H.F. INDUSTRIAL SERVICES LTD. 317-319 High Road, N.22.	**A 332**	**The Acme range of plastics welding equipment.** A new, fast-cycling automatic press in the 6-10kW. range. New type of double-tray shuttle press and a combined welder and clicker cutting press in the 1½kW. range.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

COOPERS PLASTIC FOAMS LTD. Wren Nest Mill, High Street West, Glossop, Derby.	**BB 521**	**Polyester and polyether foams.**
HARRISON AND JONES (FLEXIBLE FOAM) LTD. Swan Mill, Middleton Junction, Manchester, Lancs.	**CC 434**	**Purathane flexible foam blocks, sheets and cut shapes.** Exhibit includes block sections in polyether and polyester and also shows modern application in cut-shape form.
PRITEX (PLASTICS) LTD. Wellington, Somerset.	**C 75**	**Fabricated units in polyurethane foam.** Packaging units for the electronic industry. Cushions and other upholstery materials. Drop mats for unloading drums.
J. W. ROBERTS LTD. Chorley New Road, Horwich, Bolton, Lancs.	**C 78**	**Polyurethane rigid foam insulation produced by spraying and pouring from new equipment.**
SPICERS LTD. 19 New Bridges Street, E.C.4.	**BB 529**	**Phenolic foam.**
WHIFFEN AND SONS LTD. Willows Works, Derby Road, Loughborough, Leics.	**BB 525**	**Expanded pvc leathercloth and cushioning. Expanded rubber and expanded Ralsin.** Products on display for first time.

Blow Moulding

MACHINERY

IT is less than a decade since blow moulding was introduced as a mass-production commercial proposition in the UK. In the early days, parisons were made on injection presses or extruders and carried by hand to the blow moulding equipment. Even so, speeds were startling and rapid development began. Today, automatic equipment is being made for working at high speeds and for making bottles from the smallest to the largest, 30 gallons capacity not being uncommon. There is no indication that development has slowed up and blow moulding equipment is well represented at the exhibition.

BAKER PERKINS GRANBULL LTD. (Stand C45) have added Model 53 to their range of bottle blowing equipment. Models 50 and 51 produce articles at the speed of the extruder with small bottles at a rate of 1,400 per hour. The need for intermittent extrusion is avoided by positioning small standard blowing units directly under the extrusion head. Compressed air is used to motivate the system and cooling water is provided for the dies.

The equipment can be used with all materials which can be extruded in tubular form. Model 52 can produce plastics containers up to five gallons capacity although if a thin wall is acceptable, this can be increased to 10 gallons. This movement upwards in size is continued with Model 53 which can produce containers of up to 30 gallons capacity with a shot weight of 15lb. HP polythene. The model operates on the extrusion plunger principle with a platen closing pressure of 25 tons.

EDLON MACHINERY LTD. (Stand C19) will exhibit the latest type of

first disposable 1-gallon container

blow-moulded in RIGIDEX

the polyethylene plus

Just see what Cascelloid have achieved with today's leading high density polyethylene:

- LOW PRICE—containers competitive with glass and tin plate
- LIGHT WEIGHT—only a few ounces means lower handling and freight charges
- RIGID, SEAMLESS—cannot dent, virtually unbreakable. Urea cap has liquid-tight gasket
- CANNOT CORRODE—resists chemicals, oils, grease, many solvents.
- PERFECT FOR FOODS—imparts no taste or odour

This revolutionary development highlights some of the advantages of Rigidex as a packaging material . . . as moulded packs, blow moulded containers and packaging film. For further information about Rigidex, please write for Booklet No. 349

A revolutionary development in packaging, this 1-gallon, seamless, rigid container is blow-moulded in Rigidex high density polyethylene by Cascelloid, Abbey Lane, Leicester.

Rigidex is a reg'd trade mark of British Hydrocarbon Chemicals Ltd and is one of the products manufactured by that Company at Grangemouth.
Sole Selling Agents

British Resin Products Ltd A COMPANY IN THE DISTILLERS PLASTICS GROUP BRP

SALES AND TECHNICAL SERVICE DEVONSHIRE HOUSE PICCADILLY LONDON W1 HYDE PARK 0151

Distillers Plastics Serve Everyman

BLOW MOULDING

blow moulding equipment, namely, the 'Bekum' type E60/BAD110/2H twin head fully automatic blow-moulder. Four-headed blow moulding assemblies have their latest small single head machines on show.

Some time ago EMERSON WALKER LTD. (Stand C48) signed an agreement with Martin Rudolph of Velbert, West Germany, to manufacture and sell under licence in Britain and the Commonwealth, the full range of Rudolph plastics fabricating machines. The first result of this collaboration is the range of nine Emerson-Rudolph blow moulding machines capable of producing objects from 61 cu. in. to 8 cu. ft. in volume. The machines are automatically fed with a number of polymers from a remote container and have an extruder and hydraulic blow moulding unit in the assembly. Small objects are produced automatically and one operator can work four machines, although with larger products one operator is needed per machine to remove the finished objects. Intricate and large objects such as chemical plant units, piping and ducting, covers for domestic appliances and the like can be made as well as the usual tanks and carboys. A machine will be in full operation during the exhibition.

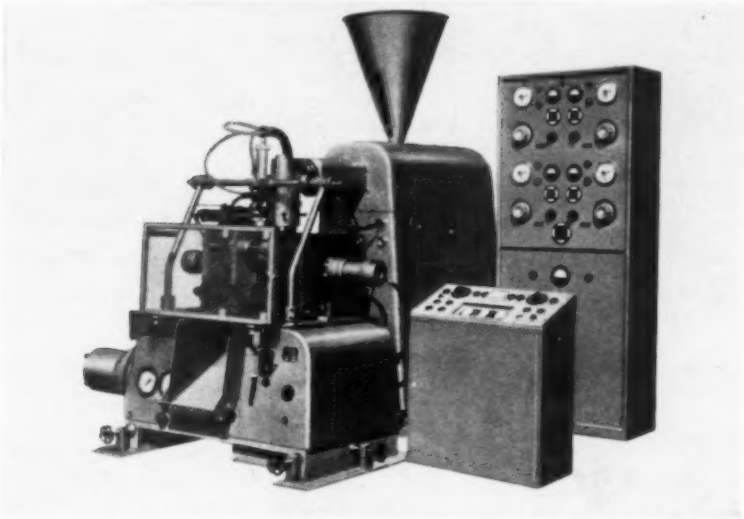


Fig. 23. Edlon Machinery Ltd.'s Bekum blow-moulding machine, model E38/BA90/2

are also available. It is the first time that the twin-head machine has been exhibited in this country and visitors will be able to see it actually producing during the exhibition. A Bekum machine is shown in Fig. 23.

Features include the special neck calibrating device which can easily be changed for the production of objects with the hollow needle system. Positive control of flow of material to both heads is assured by special electronic control flow valves. 'Bekum' will also

AMIGO MACHINE CO. LTD. (Stand C76) will be exhibiting two new blow moulding machines. Their AMC10 is fully automatic for producing large polythene containers and AMC12 is the latest fast cycling double tool machine for producing bottles up to 80oz. capacity. PECO MACHINERY SALES (WESTMINSTER) LTD. (Stand C63) will be showing their Peco-Euromatic Blow Moulder producing square bottles from the Peco 2½in. extruder. MATTHEW WYLIE AND CO. LTD. (Stand C84) will be exhibiting Wylie/Fischer blow moulding machines. The BM500 with twin extrusion heads will be in operation and the BM10/40 LTR machine will also be on show. BATTENFELD (ENGLAND) LTD. (Stand C44) will be showing blow moulding machinery made by Battenfeld Maschinenfabriken GmbH.

DIMON (ENGLAND) LTD. (Stand A306) will have a working Samafor blow moulding machine, in conjunction with a B65 extruder capable of producing 3,000 to 4,000 bottles per hour. MILLS COMMERCIAL SUPPLIES LTD. (Stand A312) will be exhibiting electromagnetic press tools demonstrating automatic feed for use in banks, processed timed.

G. PERRY AND SONS LTD. (Stand C16) will be showing machined aluminium and Kirksite moulds illustrating their pattern making services. Kirksite is proving to be a very valuable material for low pressure moulding work and is supplied by many people. When Baker-Perkins Granbull Ltd. provide moulds they are normally in this material.

PRODUCTS AND MATERIALS

DURING the past five years the production of hollow items by blow moulding has developed into a large tonnage usage for plastics materials. So far polythene has been most commonly used, but this year one firm — BRITISH GEON LTD. (Stand B216) is demonstrating to moulders the advantages offered by pvc. Examples of small toys and containers of various dimensions are displayed.

The development of throw-away bottles, jerricans and miscellaneous containers in pvc has opened up numerous possibilities for the packaging industry.

Excellent examples of blown containers in most thermoplastics can be found on a number of stands, including those of SPA PLASTICS LTD. (CC 404), P B COW (PLASTICS) LTD. (B204), the PRESTWARE GROUP (C9) and KINGSTON MOULDINGS LTD. (BB504) which is showing containers

Fig. 24.—Toys and containers blown in pvc on the British Geon Stand (B216)

up to 5½ gallon capacity.

Blow moulding is especially important for the toy industry. Using this technique it is possible to produce toys in the complete range of hardness required by the industry, thus overcoming some of the difficulties encountered in the rotational casting of pvc paste.

Clever use of this technique is made by one of the leaders in the plastics toy field, PLYSU PRODUCTS LTD., which is exhibiting on Stand CC412.

One of the largest blow moulders at Interplas is CASCELLOID LTD., a division of one of the UK's oldest (and biggest) fabricating groups, BRITISH XYLONITE. Cascelloid is showing a selection from its very wide range on stand C65, including plain, embossed and screen or off-set printed blown bottles in most thermoplastics from 3cc to 10 gallons, armoured polythene drums and domestic containers.

BLOW MOULDING

LIST OF EXHIBITORS — BLOW MOULDING

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	**B 204**	**Pvc compounds.**
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	**B 216**	**Pvc and Rigidex for blow moulding.** Also blown polystyrene and methacrylate copolymers.
ERINOID LTD. West Halkin House, West Halkin Street, Belgrave Square, S.W.1.	**B 208**	**High-density polythene and petrothene polythene.**
FARBWERKE HOECHST AG. Frankfurt Main, Western Germany. UK Representatives: Hoechst Chemicals Ltd. 50 Jermyn Street, S.W.1.	**B 219**	**Hostalen G high-density polythene. Hostalen PP polypropylene. Hostalit Z pvc chlorinated polyolefine.** These three grades including a new copolymer are available. The stand will contain examples showing the wide field of application.
FOSFATBOLAGET (STOCKHOLMS SUPERFOSFAT FABRIKS AB) Cardelligatan 1, Stockholm 5, Sweden.	**BB 507**	**Pevikon polyvinyl chloride resins.**
M AND B PLASTICS LTD. Dagenham, Essex.	**B 297**	**'Technyl' polyamides.** Special grades of nylon, including copolymers for transparent mouldings.
MONSANTO CHEMICALS LTD. 10-18 Victoria Street, S.W.1.	**C 34**	**Polythene moulding materials.**
SHELL CHEMICAL CO. LTD. Old Burlington Street, W.1.	**B 218**	**Moulding materials including Carlona polythene and pvc.** A comprehensive range of raw materials will be on show.
US INDUSTRIAL CHEMICALS CO. INTERNATIONAL P.O. Box 10, Kircherstrasse 13, Zug 1, Switzerland.	**B 209**	**Containers, housewares, etc.** These are blow-moulded in petrothene polythene.

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

AMIGO MACHINE CO. LTD. Skylon House, Park Royal Road, N.W.10.	**C 76**	**AMC 10 and AMC 12 blow moulding machines.** AMC 10 is a new, fully-automatic machine, AMC 12 is the latest fast-cycling double-tool machine for producing bottles up to 80oz. capacity.
BAKER PERKINS GRANBULL 39 High Street, Kingston upon Thames, Surrey.	**C 45**	**Models 50S, 51S, 52 and 53.** Model 53 is a new design capable of producing articles of 15lb. weight in H.D. polythene and up to 30gal. capacity.
BATTENFELD MASCHINENFABRIKEN GmbH Agents: Battenfeld (England) Ltd. Great South-West Road, Bedfont, Feltham, Middx.	**C 44**	**EKB10 blow-moulding machine.**
DIMON (ENGLAND) LTD. 181a Bath Road, Slough, Bucks.	**A 306**	**Samafor machinery.** New machine working with B65 extruder producing 3,000-4,000 bottles/hour.
EDLON MACHINERY LTD. 28-30 Little Russell Street, W.C.1.	**C 19**	**Fully-automatic blow-moulding equipment.** Twin- and four-headed blow-moulding assemblies exhibited for the first time in Europe.
EMERSON WALKER LTD. c/o E. N. MACKLEY AND CO. Dunster House, Mark Lane, E.C.3.	**C 48**	**Fully-automatic blow-moulding machine BVA 1.** Licensees of Martin Rudolph, West Germany.
MILLS COMMERCIAL SUPPLIES LTD. 241a High Street, Acton, W.3.	**A 312**	**Electromagnetic press tool.** Automatic feed — for use in banks, process timed.
PECO MACHINERY SALES (WESTMINSTER) LTD. 28 Victoria Street, S.W.1.	**C 63**	**Peco-Euromatic blow-moulder.** To be shown with the Peco 2½in. extruder producing square bottles.

BLOW MOULDING

G. PERRY AND SONS LTD. Hall Lane, Aylestone, Leics.	C 16	**Machined, aluminium and kirksite moulds.** Pattern-making services are available.
MATTHEW WYLIE AND CO. LTD. 71 Milnpart Street, Glasgow, S.1.	C 84	**Wylie Fischer blow-moulding machines.** BM500S blow-moulding machine with twin extrusion heads and the BM10/40 LTR blow-moulding machine will be in operation.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BARCLAY STUART (PLASTICS) LTD. 25-27 Brunswick Street, Luton, Beds.	C 106	**Cosmetic and all types of bottles.** Lamp shades and other industrial blown items.
CASCELLOID (DIVISION OF BRITISH XYLONITE CO. LTD.) Abbey Lane, Leicester.	C 65	**Blown bottles in all thermoplastic materials from 3cc. to 10 gallons; armoured polythene drums.** Containers for fruit essences shaped to the fruits; nasal spray containers for direct use; bottles for cosmetics, detergents, pharmaceuticals and chemicals.
P. B. COW (PLASTICS) LTD. Buckingham Road, Trading Estate, Slough, Bucks.	B 204	**All types of blown containers.**
EMERSON WALKER LTD. c/o E. N. MACKLEY AND CO. Dunster House, Mark Lane, E.C.3.	C 48	**Samples of blown articles.** These will be produced on the stand during the exhibition.
FIBRENYLE LTD. Skylon House, Park Royal Road, N.W.10.	C 76	**Polythene bottles, jars and carboys, etc.**
KINGSTON MOULDINGS LTD. Bognor Regis, Sussex.	BB 504	**Blow-mouldings up to 5½-gallon capacity.** Jerrycans in high-density polythene, and fully-decorated detergent bottles.
METAL BOX CO. LTD. (THE) Plastics Group, 37 Baker Street, W.1.	B 206	**Poly-Tainer polythene bottles for cosmetics, detergents and household products, foods and chemicals.**
PLYSU PRODUCTS LTD. Woburn Sands, Bletchley, Bucks.	CC 412	**Blow-moulded housewares and industrial containers.** A new range of Aeroplas wide-mouthed containers introduced.
THE PRESTWARE GROUP (Prestware Ltd., Lustroid Ltd., P.L. Display Co. Ltd.) Southdown Works, Kingston Road, Raynes Park, S.W.20.	C 9	**Bottles in polythene.**
SPA PLASTICS Freeman Works, Chesham, Bucks.	CC 404	**Bottles and containers in pvc, polythene and low-pressure polythene.** Plastics bottles are available of glass-clear clarity.

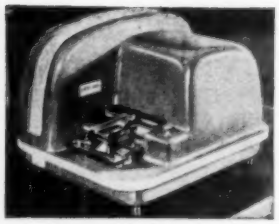
Reinforced Plastics

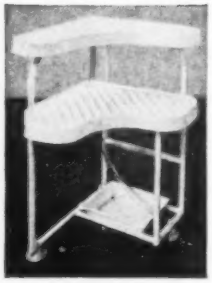
MACHINERY

IN the early days of fibre glass mouldings the equipment used was rather makeshift. Nowadays special presses have been developed and everything is much more precise. T. H. AND J. DANIELS LTD. (Stand A326) will exhibit their 150-ton low pressure moulding press, the latest in the range of presses designed specifically for the moulding of fibre glass reinforced plastics. This press is not new, except that the hydraulic circuit has been completely redesigned, giving more accurate control of the position at which the various controlled speeds are engaged. The tables are 4ft. x 3ft., the daylight is 6ft. and the stroke is 4ft., a most useful size.

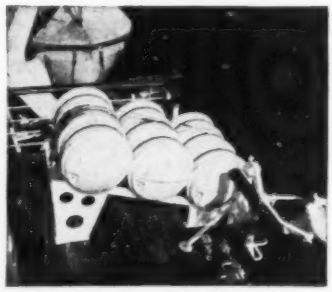
In mixing resins, well designed blenders are necessary. Model 29Z twin 'Z' bladed mixing machines of WINKWORTH MACHINERY LTD. (Stand C90) is specially designed for the most viscous materials. High frequency welders are frequently required in the manufacture of reinforced plastics, and HF INDUSTRIAL SERVICES LTD. (Stand A322) will be exhibiting their Acme range of plastics welding equipment. (Further details may be found under Fabrication from Sheet.) Large inexpensive moulds are also of the utmost importance in reinforced plastics work and has made many large mouldings possible. G. PERRY AND SONS LTD. (Stand C16) will be exhibiting aluminium, Kirksite or Mechanite moulds and large wooden models to demonstrate their pattern-making services.

METROPOLITAN PLASTICS LTD. (Stand C50) will be exhibiting the MAS Junior Depositor Type SPA2. This is a means of combining resin and cut-glass fibre and spraying on to surfaces. The big machines, Types SPV1 and BK111, cannot be fully exploited because of space limitations which the new machine overcomes. B. F. CARTER AND CO. LTD. (Stand A319) will have a working demonstration of a horizontal 24-carrier yarn braiding machine, braiding nylon tube with Terylene multi-yarn reinforcement.





all-round successes with Cellobond polyester resins



Boat hulls and van bodies . . . machine covers and chemical containers . . . lightweight trailers and rustproof guttering . . . these are just a few of the successful products now being made with Cellobond polyester resin and glass fibre.

Designers and manufacturers are specifying Cellobond polyester resins because of their unrivalled resistance to ageing, weathering and chemical attack. And because no other material so completely endows style with strength, beauty with usefulness.

Full information about the properties and processing of Cellobond polyester resins is given in Booklet No. 80.

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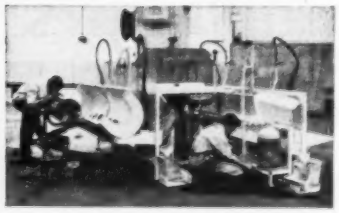

All-round service

★ BRP can put you in touch with specialists in Cellobond polyester/glass construction.

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REINFORCED PLASTICS

PRODUCTS AND MATERIALS

ONE of the fastest growing sections of the British Plastics Federation is the Reinforced Plastics Group. When the group held its second international conference in London late last year, it attracted more than 640 delegates. Production of polyester resins in the UK increased from 4,700 tons in 1958 to 6,700 tons in 1959 — which represents a production of reinforced plastics of about 10,000 tons. At the international reinforced plastics conference Brian Parkyn, a director of SCOTT BADER AND CO. LTD., forecast that the potential market was between 40,000 and 60,000 tons a year. He thought that the time would soon come when upwards of 15% of all commercial vehicles would have GRP hubs, wings and bodies and 10% of factory roofs would be fabricated from corrugated plastics. Scott Bader is exhibiting products made from its polyester resins on Stand B232.

Inspection Manholes

Another household name in the resin field, BAKELITE LTD., is coupled with that of the well-known fabricator TOUGH PLASTICS LTD. on Bakelite's Stand (C38).

An all-plastics container, for the road transportation of hydrochloric acid or sodium hypochlorite, is upended on the stand so that visitors may look inside one of the three manholes to inspect the Vybak lining. Manufacture of the tank entailed forming Vybak sheets to the required shape and supporting them with a glass-fibre laminate bonded with polyester resin. The grey, pigmented laminate is then given a coating of isocyanate resin.

Controlling Surge

Tough Plastics has been using this method of constructing chemical storage tanks for the past three years, and there are many hundreds in service. This is, however, only the second 'Tufplas' road-tanker — the first was made for a German chemical company. Special measures have been taken to control 'surge', or serious weight transference, which takes place under heavy braking. The plastics road-tanker weighs about half a ton, whereas a similar sized steel tanker would tip the scale at about three tons.

High Precision

There are a number of interesting developments on the stand of BRITISH RESIN PRODUCTS LTD. (B216). Matched-die polyester/glass mouldings are featured, including one for the water container of a spin dryer produced independently by J. W. ROBERTS LTD., THERMO PLASTICS LTD. and BRITISH MOULDED PLASTICS LTD. The high degree of precision required by this moulding can be seen from the fact that it necessitates a draw of 21in. with an allowance of only 1° 21in. on the sides.

Also on the BRP stand are water soluble Epok resins for paints, which are said to be the only UK developed resins of this type, and flame-retardant polyester/glass sheeting which recently obtained Ext.SAA grading from the DSIR. This grading means that, tested according to BSS476 part 3, using three specimens of each type of sheet, there was no penetration of fire within one hour and no spread of flame whatsoever.

Specialized Finishes

Besides the resins, the conventional partner in reinforced plastics is well represented. Amongst the glass fabric and roving manufacturers is FOTHERGILL AND HARVEY (Stand C7), which is showing highly specialized finishes for fabrics. Notable applications are the Garan finish for polyesters and the Nol 24 Universal finish for high laminate strengths with polyester, epoxide and phenolic resins. The company is announcing several new finishes at the exhibition.

Tyglas 3D woven shapes are also on show, produced in any natural or synthetic fibre, woven shapes enabling fabricators to produce improved components at reduced cost. Labour costs are reduced and the finished product is said to have a far higher degree of uniformity. Also produced by this specialized three-dimensional weaving method is radial tape, newly developed and shown for the first time this year.

Another producer of pre-impregnated material will be found on Stand C5. LEICESTER LOVELL AND CO. LTD's principal exhibit is Resnit, which, the company claims was the first pre-impregnated material capable of being used for the mass production of reinforced plastics components of complex shape. The formability of Resnit, and the speed at which pressings can be made, is being demonstrated on the stand. The range of Epophen epoxide resins and hardeners is represented by exhibits which show their use for plastics tooling, the potting and encapsulating of electrical components, structural laminating, glass reinforced tubing and road surfacing. Examples are on show of plastics tooling (die aids, jigs, checking fixtures, patterns) made with these resins in the company's own plastics tooling department at Southampton, where production tools are made to order for the aircraft, automobile and general engineering industries.

Glass Fibre Beacons

Another well-known name in the plastics reinforcement field is TURNER BROTHERS ASBESTOS CO. LTD. (Stand CC408). The two entrances to the exhibits on this stand are commanded by beacons — full-size lamp standards —produced by A. C. Ford Ltd. The stand foyer is covered completely by an 'Auto-Craft' canopy, while the office is constructed principally of glass fibre materials — simulated Cotswold stone, and flat corrugated sheeting. In the 'Durestos' section, several items moulded from this resinated asbestos material are shown (Fig. 25), including a laminated surface heat panel.

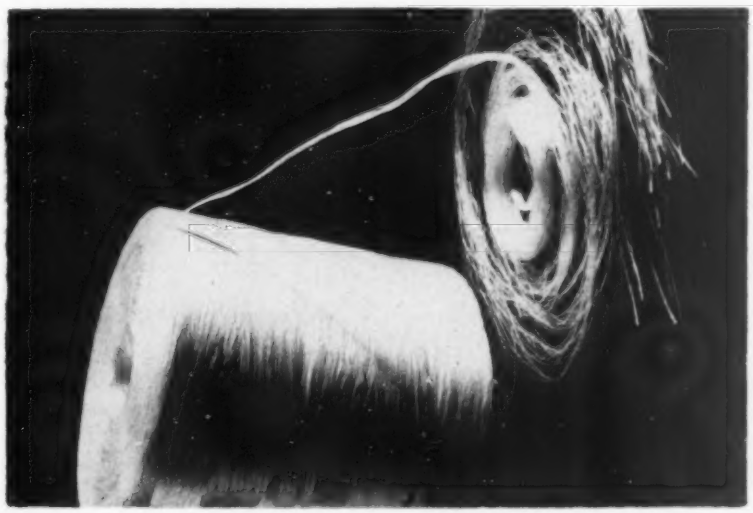

Fig. 25. Turners Duraglas rove. Part of this company's stand is fabricated from its own materials

REINFORCED PLASTICS

LIST OF EXHIBITORS — REINFORCED PLASTICS

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

AEROPLASTICS LTD. 1-7 Carlyle Avenue, Hillington, Glasgow, S.W.2.	C 27	**Pre-impregnated materials.**
ARTRITE RESINS LTD. 44-46 Kingsway, W.C.2.	CC 430	**Polyester resins, colour pastes, and dough-moulding resins.** PE90, recently-introduced fast-hardening polyesters, need no curing.
BAKELITE LTD. 12-18 Grosvenor Gardens, S.W.1.	C 38	**Chemical road tanker.** Glass-reinforced polyester tank made by Tough Plastics Ltd.
BIP CHEMICALS LTD. Oldbury, near Birmingham, War.	C 35	**Beetle resins for laminating.** Filon translucent sheeting, and a moulded glass fibre-reinforced boat will also be displayed.
BIRKBYS LTD. Liversedge, Yorks.	B 222	**The Elo range of resins and moulding powders includes Elo phenolic moulding powders complying with the different grades of B.S. 771.** The resins uses include bonding, laminating, abrasive impregnating, and friction material applications.
CIBA (ARL) LTD. Duxford, Cambs.	CC 434	**Araldite epoxy resins.** Aerolite urea formaldehyde resins, Aerodux resorcinol formaldehyde resins.
CORNELIUS CHEMICAL CO. LTD. Ibex House, Minories, E.C.3.	BB 513	**Plexit 51 and Plexit 60, acrylic laminating resins.** Glass fabrics and glass mats, and Versamid polyamide resins.
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	B 216	**Cellobond polyester resins and glass-fibre-reinforced components.** Isophthalic polyesters, flame-retardant polyester/glass sheeting, match die mouldings and Rockite dough-moulding compounds.
FERRO ENAMELS LTD. Plastics Colour Division, Wombourn, near Wolverhampton, Staffs.	BB 516	**Chopped strand mats, polyester pigment pastes, ferro coloured gel-coats, ferro coloured laminating resins, and ferro web gel-coats.** All exhibited for the first time.
LEICESTER, LOVELL AND CO. LTD. North Baddesley, Southampton, Hants.	C 5	**Resnit pre-impregnated fabric and Epophen epoxide resins and hardeners.** The formability of Resnit and the speed at which pressings can be made will be demonstrated, and examples of pressings made with Resnit will be shown. Epophen exhibits will show such applications as plastic tooling, encapsulating of electrical components and structural laminating.
M AND B PLASTICS LTD. Dagenham, Essex.	B 207	**Pevalon and Cipoviol polyvinyl alcohol films.** Widely used as release agents and for bag moulding in connexion with polyester-glass-fibres fabrication.
W. A. MITCHELL AND SMITH LTD. Church Path, Church Road, Mitcham, Surrey.	BB 519	**Polymaster range of polyester resins.** Exhibits and stand are constructed from glass-fibre-reinforced plastics.
PECHINEY-SAINT GOBAIN Agents: K. W. Chemicals Ltd. Caroline House, 55-57 High Holborn, W.C.1.	BB 534	**Polyesters.**
PERMALI LTD. Bristol Road, Gloucester.	CC 414	**Permaglass glass-fibre sheet in eight grades.** Special feature of low-cost glass-fibre moulded sheet.
RESINOUS CHEMICALS LTD. Blaydon-on-Tyne, Co. Durham.	BB 543	**Wresinol 11000 range of polyester resins.** Wresinol 11006 is a high heat distortion point polyester.
LLEWELLYN RYLAND LTD. Balsall Heath Works, Birmingham, 12.	BB 515	**Colour dispersions for plastics and pvc colour paste.** Polyester colour paste and coloured polyester gel-coats.
SCOTT BADER AND CO. LTD. Wollaston, Wellingborough, Northants.	B 232	**Crystic polyester resins and Alpon dough-moulding compounds.** The resins and ancillaries are for glass-fibre-reinforced plastics.
SHELL CHEMICAL CO. LTD. Old Burlington Street, W.1.	B 218	**Epikote epoxy resins.** Electrical applications and building materials will be displayed.
JOHN AND E. STURGE LTD. Wheeleys Road, Birmingham, 15.	BB 518	**Calofil A4, Calofil B1, Calofil E2, Sturcal M.** High-quality fillers for use in polyester and epoxide resins. Used in match metal moulding and dough-moulding compounds.
TURNER BROTHERS ASBESTOS CO. LTD. P.O. Box 40, Rochdale, Lancs.	CC 408	**Durestos resinated asbestos-moulding material.**
VERSIL LTD. Rayner Mills, Liversedge, Yorks.	CC 440	**Glass-fibre long- and chopped-strand mat for plastic reinforcement.** Long-strand mat is a speciality giving extra strength.

REINFORCED PLASTICS

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

T. H. AND J. DANIELS LTD. Lightpill Iron Works, Stroud, Glos.	**A 326**	**150-ton low-pressure moulding press.**
METROPOLITAN PLASTICS LTD. UK agents for Aust and Schuttler Dusseldorf, Germany.	**C 50**	**The new MAS SP A2 junior model resin glass depositor and various mouldings made by the MAS process.** On show for the first time in this country.
G. PERRY AND SONS LTD. Hall Lane, Aylestone, Leicester.	**C 16**	**Aluminium, kirksite and mechanite moulds and large wooden models.** Pattern-making services will be available.
WINKWORTH MACHINERY LTD. 65 High Street, Staines, Middx.	**C 90**	**Mixing and blending machinery.** This includes the U22S, a new horizontal 'U' trough dry blender; 29Z twin Z-bladed mixing machine and the CT40, a twin-drum tumbler.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BRISTOL AEROPLANE PLASTICS LTD. Filton House, Bristol, Glos.	**CC 425**	**Wide range of mouldings in reinforced materials.** These include Epoch pipe, the Lotus Elite car body, Brensal Princess cabin cruiser and Enfield motor-cycle shield.
CASCELLOID (DIVISION OF BRITISH XYLONITE CO. LTD.) Abbey Lane, Leicester.	**C 65**	**Cascalite roof sheeting and flat or reeded panels for partitions; machine covers, general mouldings, barrel-vault roof-lights.** One-piece translucent van roofs and other details for the motor-body-building industry.
P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	**B 204**	**Glass-fibre fabrications.**
FIBRE FORM LTD. Garratt Mills, Trewint Street, S.W.18.	**C 72**	**Mouldings in Fibre Form fibrous plastic.** Examples of special finishes will be available and new material with advanced mechanical properties will be shown for the first time.
FLEXO PLASTIC INDUSTRIES LTD. South Chingford, E.4.	**C 71**	**Range of mouldings in reinforced plastics,** and all forms of reinforced plastics and laminated assemblies utilizing glass fibre.
FLEXO PLYWOOD INDUSTRIES LTD. South Chingford, E.4.	**C 71**	**Flexene melamine panels and Flexo vynalast hardboard.**
INSULATORS LTD. Leopold Road, Edmonton, N.18.	**C 22**	**General contact mouldings for electrical and domestic appliance industries.**
LEICESTER, LOVELL AND CO. LTD. North Baddesley, Southampton.	**C 5**	**Tooling in Epophen.** Die aids, jigs, checking, fixtures, patterns, all made with Epophen resins will be shown.
A. S. LESTER LTD. 95 Hackney Road, E.2.	**BB 542**	**Decopon Panelyte, decorative laminated melamine boards.** Recently introduced and available in a very hard gloss finish or a semi-matt finish.
MARGLASS LTD. Sherborne, Dorset.	**C 8**	**Woven-glass and Terylene fabrics. Pre-impregnated glass fabrics.** A range of products made from these will be displayed.
MARSTON EXCELSIOR LTD. Fordhouses, Wolverhampton, Staffs.	**CC 423**	**Wide selection of reinforced plastics for industrial uses.** Included are models of some components for the Nimrod particle accelerator at Harwell.
NORTH-WESTERN REINFORCED PLASTICS SOCIETY c/o James Halstead Ltd. River Works, Irkdale Street, Manchester, 8.	**BB 502**	**Co-operative stand of a group of companies in North-West England.** A wide range of mouldings will be displayed illustrating various manufacturing techniques.
PERMALI LTD. Bristol Road, Gloucester.	**CC 414**	**Permali impregnated laminated densified wood.** Permaglass glass-fibre-reinforced plastics and Permatred heavy-duty laminated wood flooring.
J. W. ROBERTS LTD. Chorley New Road, Horwich, Bolton, Lancs.	**C 78**	**Ferobestos — asbestos-reinforced plastics in the form of rods, tubes and sheets.** A continuous colour film showing manufacture of reinforced products will be shown.
SPICERS LTD. 19 New Bridge Street, E.C.4.	**BB 529**	**Attracta reinforced plastics.**
TURNER BROTHERS ASBESTOS CO. LTD. P.O. Box 40, Rochdale, Lancs.	**CC 408**	**Chemically and mechanically bound chopped-strand-glass Duramat.** Duraglas products will include yarn-based woven fabrics, woven roving fabrics, and woven-glass tapes.

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Chemicals

MACHINERY

THERE are very rarely any new developments in the field of mixing dry chemicals but the latest Gardner machines seem to have introduced some rather revolutionary changes. Apart from these there are a number of other mixers on show for mixing or tumbling various chemicals in the plastics industry.

WM. GARDNER AND SONS (GLOUCESTER) LTD. (Stand C81) will be showing two entirely new productions, the Airmix and the Stirred Bunker and Belt Feeder Unit. (See Figs. 26 and 27.) The former machines achieve the mixing by means of an airblast. Compressed air is introduced into the vertical chamber through nozzles in the mixing head at the base of the machine. Air blasts are given every one or two seconds and these agitate the powders in a spiral motion to give a total mixing time of less than one minute. The mixed material is rapidly discharged through a pneumatically operated valve. Maintenance is low because there are no internal moving parts and cleaning can be effected by airblasts except for the textile filters in the top of the machine. A useful feature of the Airmix is that it can be used as a combined mixer and sprayer to enable liquids to be mixed with the powders. Capacities vary from 2 cu. ft. to 800 cu. ft. and an interesting point which does not apply to most other mixers is that even the largest machine will efficiently mix a few pounds of material.

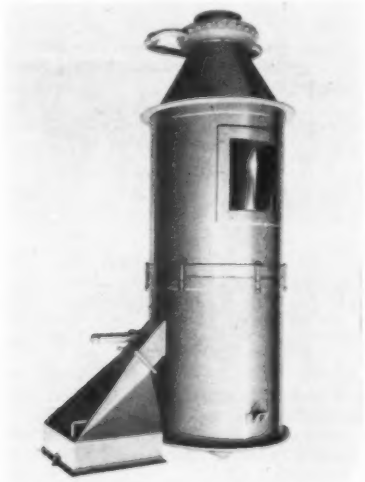

Fig. 27. The Gardner Airmix—said to mix powders ten times faster than by conventional methods

The Gardner Stirred Bunker and Belt Feeder enables materials of a moist or sticky nature to be automatically stored, weighed and continuously fed without 'bridging', common in so many automatic weighing devices and hoppers. It will give constant volume or weight feeding with an accuracy of ±1% and even compensates for variable density in the powders. Standard sizes are available. Other Gardner exhibits include a jacketed mixer for mixing powders with plasticizers and their well-known double cone mixers.

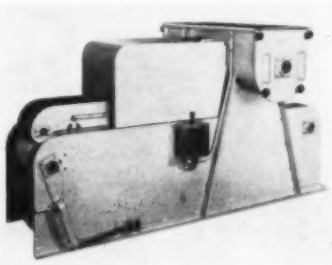

Fig. 26. Gardner stirred bunker and belt feeder unit

WINKWORTH MACHINERY LTD. (Stand C90) will be exhibiting a range of blending machines. These include Model 29 Z twin 'Z' bladed blender, a heavy duty model for the most viscous materials; Model U 22 S, a new machine with cylindrical trough and 'Contra Flow' blades produced for the dry blending of polythene and Model CT 40 twin drum tumbler. FAWCETT PRESTON AND CO. LTD. (Stand C88) will be exhibiting their Bolling spiral-flow intensive mixer from which the front cover will be removed to allow the inspection of rotors and bearings.

PRODUCTS and MATERIALS

PRODUCTS of the LAPORTE GROUP (Stand C3) include titanium oxide, the opacity and reducing power of which has made it a classic pigment for incorporating in white and pale-coloured articles. Two interesting developments of a member company (Peter Spence) are titanium acetylacetonate for cross-linking and curing accelerators, and bromophenyl glycidyl ether, a flame retardant additive for epoxy resins.

Recently Laporte took over Howards (Ilford) Ltd., and a number of this company's products are being shown, among them the cyclic ketones Sextone (cyclehexanone) and Sextone B (methylcyclehexanones), which are solvents for vinyl polymers; the Howflex liquid and solid plasticizers and phthalic anhydride for resin manufacture.

Ultra-violet Barrier

A number of recent developments are featured on the GEIGY CO. LTD. Stand (CC407). An optical whitening agent and an ultra-violet barrier for plastics are being demonstrated by means of a working model. Among the chemicals here are Reocure: a solid cross-linking agent for epoxide systems; Irgasan FP (fungistat) and Irgasan BS215 (bacteriostat): non-toxic products for formulation in pvc; Product CGI: a copper greening inhibitor for pvc; Reoplex 641: a polyester plasticizer for high temperature cable formulations; Reoplex 531: a polyester plasticizer for pvc; and Reomol RIG: a low viscosity plasticizer recommended for use in rigisol formulations for rotational casting.

Colours on the Geigy stand include: Irgafiner pigments: a new range of special pigments designed to give good dispersion in low and high density polythenes and polypropylene with a minimum of mechanical working; Irgalite Fast Green GNB: a new metal complex green pigment; Irgalite Fast Brilliant Blue BLR: a red shade phthalocyanine blue pigment for natural and synthetic rubber.

The ultra-violet barrier being displayed by Geigy is Tinuvin P, which protects polymers over the whole of the UV wave-band.

Recent interesting work has been done by CROXTON AND GARRY LTD. (B220) on the use of aluminium wool fillers in polyester and epoxy resins. These and other Omya fillers are being shown.

NOVADEL LTD. (Stand CC424) is featuring organic peroxide catalysts for all polymerization processes and JOHN AND E. STURGE (Stand BB518), a well-known name for calcium carbonate, is showing a wide range of grades of precipitated $CaCO_3$.

One of the interesting overseas firms — SKANSKA ATTIKFABRIKEN, of Perstorp, Sweden — will be found on Stand B225. Chemicals featured include Hexamethylenetetramine, Pentaerythritol (used for alkyds, polyesters and plasticizers), Trimethylolpropane (used for alkyds, polyethers and polyurethanes), and lacquer resins.

Two giants of the chemical industry are showing wide ranges of chemicals: IMPERIAL CHEMICAL INDUSTRIES LTD. and the chemical division of DISTILLERS CO. LTD. (Stand CC429). The Dyestuffs Division of I.C.I. (Stand CC420) is featuring polymeric plasticizers and pigments for plastics.

CHEMICALS

LIST OF EXHIBITORS — CHEMICALS

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BX PLASTICS LTD. Higham Station Avenue, E.4.	B 224	The exhibits include **nitro-cellulose, terpene resins, camphor, ino bornyl acetate. Dipentene and organo-tin compounds.**
THE CHEMICAL SUPPLY CO. LTD. 7-8 Idol Lane, Eastcheap, E.C.3.	CC 433	**Plasticizers, solvents, formaldehyde, hexamine, cadmium colours, and ancillary products.** New plasticizers, stabilizers and lubricants for pvc are being shown for the first time.
CIBA (ARL) LTD. Duxford, Cambs.	CC 435	**'Araldite' epoxy resins for adhesives and laminating with glasscloth. 'Aerolite' urea formaldehyde and 'Aerodux' resorcinol-formaldehyde wood glues. 'Redux' adhesive.**
CORNELIUS CHEMICAL CO. LTD. Ibex House, Minories, E.C.3.	BB 513	**Nacromer synthetic pearl pigments. Mearl Maid natural pearl essences.**
CROXTON AND GARRY LTD. 27 St. James Road, Kingston upon Thames, Surrey.	B 220	**Omya fillers for pvc, polythene, polyester and epoxy resins. Abbey 100 conductive vinyl compound. Aluminium wool in polyester and epoxy resins.**
THE DISTILLERS CO. LTD. Chemical Division, Devonshire House, Piccadilly, W.1.	CC 429	**A wide range of chemicals for all aspects of the plastics industry.**
FERRO ENAMELS LTD. Plastics Colour Division, Wombourn, near Wolverhampton, Staffs.	BB 516	**Inorganic pigments for thermoplastics.** Pigments with outstanding resistance properties, exhibited for the first time.
FOSFATBOLAGET (STOCKHOLMS SUPERFOSFAT FABRIKS AB) Cardellgatan 1, Stockholm 5, Sweden.	BB 507	**Melamine crystals.**
GEIGY CO. LTD. Rhodes, Middleton, Manchester.	CC 407	**Plasticizers, pigments, U.V. absorbers, optical whitening agents, fungistats, and bacteriostats.**
I.C.I. DYESTUFFS DIVISION Woburn Lodge, Upper Park Road, Salford, Manchester.	CC 420	**Isocyanates, polyethers and polyesters.** For the production of rigid and flexible foams.
KINGSLEY AND KEITH (CHEMICALS) LTD. Rex House, 38 King William Street, E.C.4.	CC 405	**Low-molecular-weight A.C. polythene and nylon moulding compound.** Advastab range of pvc stabilizers and Harmon colour range of organic pigments.
LAPORTE GROUP OF COMPANIES New Bond Street House, 1-5 New Bond Street, W.1.	C 3	**Organic peroxy compounds.** These compounds include latest developments for room-temperature polymerization of polyester glass-fibre laminates.
CHARLES LENNIG AND CO. (GREAT BRITAIN) LTD. 26-28 Bedford Row, W.C.1.	BB 547	**Paraplex and Monoplex plasticizers.**
MAY AND BAKER LTD. Dagenham, Essex.	B 207	**Industrial chemicals including pearl pigments, and reodorant compounds for the plastics industry.** The 'Planorome' range of reodorant compounds, used to impart attractive odours to plastics, is of interest in the packaging industry.
NOVADEL LTD. St. Ann's Crescent, Wandsworth, S.W.18.	CC 424	**Organic peroxide catalysts for all polymerization processes. Lead, barium/cadmium and epoxy oil and ester stabilisers for pvc and other halogenated compounds:** tribasic lead maleate, liquid barium/cadmium and new epoxy esters have recently been added to the list.
PECHINEY, SAINT GOBAIN Agents: K. W. Chemicals Ltd. Caroline House, 55-57 High Holborn, W.C.1.	BB 534	**Accelerators, catalysts, and adhesives.**
SHELL CHEMICAL CO. LTD. Old Burlington Street, W.1.	B 218	**A comprehensive range of raw materials for the plastics industry.** Including styrene monomer and materials for the manufacture of polyurethane foams.
SKANSKA ATTIKFABRIKEN Perstorp, Sweden. Associated with Perstorp Products (Gt. Britain) Ltd. 157 High Street, Orpington, Kent.	B 225	**Formaldehyde, hexamethylenetetramine.** Pentaerythritol, trimethylolpropane.

CHEMICALS

JOHN AND E. STURGE LTD. Wheeleys Road, Birmingham, 15.	BB 518	**Sturcal, Calofil and Calofort grades of precipitated calcium carbonate, Caloxol C31, Citric acid.** High-quality $CaCO_3$ fillers for use in pvc, polythene, polyester and epoxide resins.
VINYL PRODUCTS LTD. Butter Hill, Carshalton, Surrey.	B 217	**Vinamul, Vinalak, Vinacryl emulsions and solutions, and Vinapol resins.** Raw materials for the paint, paper, textile, polish, building and adhesives industries.
WHIFFEN AND SONS LTD. Willows Works, Derby Road, Loughborough, Leics.	BB 525	**Genitron blowing agents.** Genitron AZDN, Genitron AC, Genitron BSH and Genitron OB for free expansion of pvc, rubber, polythene and ralsin.
WILLIAMS (HOUNSLOW) LTD. Hounslow, Middx.	BB 511	**Colour chips of colour ranges for polystyrene, polythene and polyester resin.** There is an increased colour range for most plastic materials.

Fabrication from Sheet

MACHINERY

AS with so many other processes in the plastics industry where presses are not employed, methods of fabrication have tended to develop in a random manner. Even in the best known companies which fabricate from thermoplastic sheets, the use of a wide variety of clamps, blocks of wood and other makeshift equipment is commonplace. It is interesting, therefore, to see fabrication aids being developed in a systematic manner, and such methods are well represented at the exhibition.

The most obvious technique for sheet welding, particularly thin sheets, is the high frequency sheet welder, and there will be a number of these on display. There will also be special aids for fabricators in the form of buttwelding tables and like devices, and much ancillary equipment in the way of saws, sanders, shears, and so on. Some of the more mass-production methods for making bags and buttons from sheet will also be on show with a few demonstrations.

HF Welding Equipment

HF INDUSTRIAL SERVICES LTD. (Stand A332) are increasing their well-known Acme range of plastics welding equipment. Their Auto Press 206 is a new fast cycling automatic press in the 6-10kW range; their Through Press 306 is a completely new type of double tray shuttle press also in the 6-10kW range, and the Acmekut is a combined welder and clicker cutter press in the 1½kW range. All three will be on show for the first time. Some well-known Acme welders will also be on display, including HF tandem welders with two heads, the Acme No. 2 VHP welder and several standard welders of various outputs. All of the welders have a number of well-known and proved features, including no flash troubles; accurate control of the depth of penetration of the electrode to 0.001in.; ease of adjustment of electrode pressure without upsetting levelling; and ease of adjustment of welding power. The machines are designed for interchangeable platens and the very high frequency model is suitable for the welding of cellulose acetate and other rigid or unplasticized materials. It may also be used for hot creasing of cellulose acetate without the use of high frequency, and is comparable in performance with normal 1.2kW machines. It will comfortably weld 60 linear inches on 0.018in. double thickness pvc or execute tearseal welds of 36in. length on 0.005in. double thickness pvc.

RADYNE LTD. (Stand A330) will be exhibiting a wide range of their high frequency welders. Radyne Model W/6P is a pneumatically operated press-welder with 24in. square platens. It is upstroking where the lower bolster moves upwards to a fixed bolster; it is fitted with a double shuttle loading assembly and can be fitted with any standard Radyne generators from 800 watts to 4kW., the latter being new. The Radyne Junior Autodex will demonstrate fast cycling and accurate indexing and will be coupled to a new through type press. The complete Radyne FW range will be on view which, although normally pedal operated, can be converted to pneumatic. The Radyne W/5P is a fourway through-type press welder, which means that it can be loaded from four sides by the use of interlocked tray loading.

The Radyne W/IP is a medium-sized through-type welder which will be on view coupled with a 6kW. output RF generator. In addition to the welders themselves, a variety of ancillary equipment will be shown. This includes portable generators, specialised hand applicators, and semi-portable presses will be available for demonstration. The hand applicators are available for the manufacture of a host of components, varying from the covering of rivet heads to the manufacture of very large tarpaulins.

REDIFON LTD. (Stand A342) will be exhibiting several items of new equip-

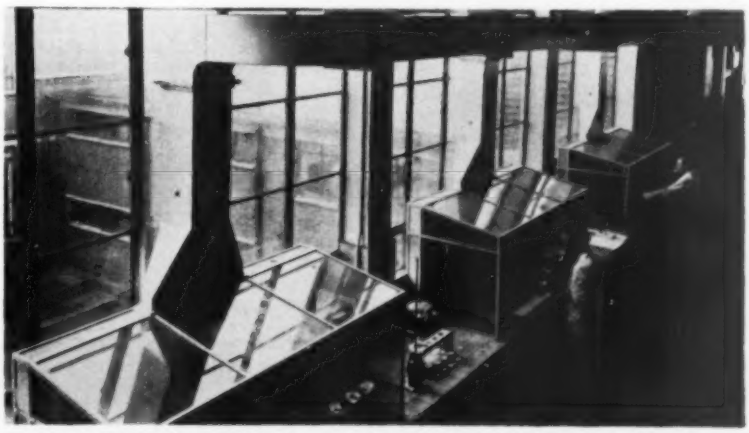

Fig. 28. BX Plastics Ltd.'s Cobex rigid vinyl ducting used for extracting corrosive fumes from the metallurgical laboratory of Leyland Motors Ltd. BX Plastics are showing a variety of sheet materials on stand B224

G1

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Mellowhide Products Ltd (B.R. curtaining, luggage).
Jas. Williamson & Son Ltd (wall covering, 'Firmback' chair).
Bernard Wardle (Everflex) Ltd
(Decca Debonaire, 'Stamford' dining chairs)

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Distillers Plastics Serve Everyman

FABRICATION FROM SHEET

ment for the first time. Type JP19 is an 800 watt vhf welder with a 5¼in. daylight and a number of accessories, including micrometer-type depth stop, two-position foot pedal control, etc. The JP25 is a larger capacity version of JP19 with an output of 1.5kW. The JP22 is a Bridge press powered by a 12kW. generator designed for operation on a continuous basis made possible by free access from front and

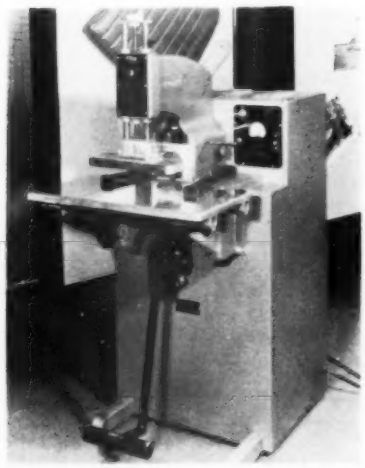


Fig. 29. Plastic sheet welder by Radio Heaters Ltd.: Radyne FW 1 7

rear. The JP24 35kW. plastics welder is a larger version of the JP20 embossing press introduced to satisfy the demands for even bigger sections of upholstery with more detailed embossed patterns. In addition to the above items a new 3kW. dielectric generator for welding (JP23); a special patented floor-sealer, and a combination unit for welding leather to plastics (RH77) will be exhibited and available for working demonstrations.

F. J. EDWARDS LTD. (Stand A302) will be exhibiting their Sealwel desk-type HF welding machine. This includes a 3kW. generator and a pendulum type foot pedal which operates the precision machined head through a toggle action thus minimizing operator fatigue. The cast aluminium lower platen is 36in. x 18in. The Zeva Mini-Sealer Packfix will also be exhibited. It is a small treadle-operated package sealer (not HF) of 70 watts capacity and a sealing width of 7.1/16in. suitable for polythene foils, etc. Variation of sealing temperatures between 175°F. and 360°F. can be obtained.

Methods of Fabrication

BIELOMATIK (LONDON) LTD. (Stand C23) are showing forming and butt-welding equipment for fabrications from sheet and extruded sections. These are the very interesting butt-welding table and heating mirror of Hans Biel which will be demonstrated on the stand using a new 4ft. wide table. The table consists of three accurately aligned sections, the centre section which is fixed; a rear section mounted on rollers so that it can be freely moved back and forth in relation to the centre section, and a front section mounted on a hinge allowing it to be swung up and down. A heating sword is suspended across the table and secured to a swing arm at each side of the table. This allows the sword to be accurately positioned between two rear sections of the table or to the fulcrum of the hinged section or out of the way. Any heated parts can be surfaced with ptfe to prevent sticking. The one metre bench will handle sheets 39¼in. wide and ⅜in. thick and the two metre bench will handle sheets up to 78¼in. wide and ⅜in. thick.

Cutting Press

The Hans Biel heating mirror is simple but effective. It is essentially a thermostatically controlled vertical hot plate with a heated blade at the top. A pipe may be butt welded very easily by pressing the ends on each side of the mirror and after a short time joining them together and allowing to cool. If the mirror is laid on its side it may be used as a hot plate.

DELBAG AIR FILTERS LTD. with GOODBURN PLASTICS LTD. (Stand B234) will be exhibiting high-speed welding torches and Thermobande welding equipment.

F. J. Edwards Ltd. will exhibit the Sandt Model ST139 electro-hydraulic swing arm clicking press and the Sandt Model ST122 electro-hydraulic 4-column cutting press. The former has a pressure of 18 tons and a stroke adjustable from 0in.-2⅜in. The latter can be used for all kinds of plastics sheets or layers, etc., and has a pressure of 130 tons, a stroke of from ⅜in.-4in. and control is by push buttons.

Ancillary Equipment

INTERWOOD LTD. (Stand A335) will exhibit a wide range of ancillary equipment. The OFN/OFC electric high-speed router may be used for many purposes such as cutting panels faced with melamine laminates and spectacle frames. The HM40D router is similar but is either portable or built on a light type stand. Other equipment includes the DH53 double cut-off squaring saw bench; the FM3D large motorized trimming and strip cutting machine; the HM5 portable trimmer and plastics cutting shears. There will also be a range of surface sanding/finishing machines including wet and dry surface sanding, two drum endless belt sander, etc., together with saw sharpeners and setters.

Finishing and Packaging

ENGIS LTD. (Stand C52) will show a selection of equipment useful for finishing purposes. This includes Abradisc universal grinding equipment, Abracap abrasive caps and sleeves on rubber holders, Engis - Vonnegut abrasive finishing heads, expanding internal and external helical slot laps, precision flat lapping machines and Hyprez diamond compound for precision finishing.

SYLPON MFG. CO. LTD. (Stand A301) in conjunction with DR ING. BOEHME AND CO., MASCHINENFABRIK MINDEN, will be exhibiting button-making machinery. The Gigant will be seen in the UK for the first time, being a fully-automatic button shaping press. The Autotitania automatic turning machine, with built-in photoelectric colour selector will also be on show. BONE BROTHERS (Stand C91) will be showing polythene bag-making machinery. US INDUSTRIAL CHEMICALS CO. (Stand B209) will have a demonstration of various late model MA polythene packaging systems, the MA machine with shrink tunnel and the MA Jumbo for automatic packaging of extra large products. Visitors are invited to bring along products up to 30in. long x 30in. wide x 5in. thick for sample packaging in this machine.

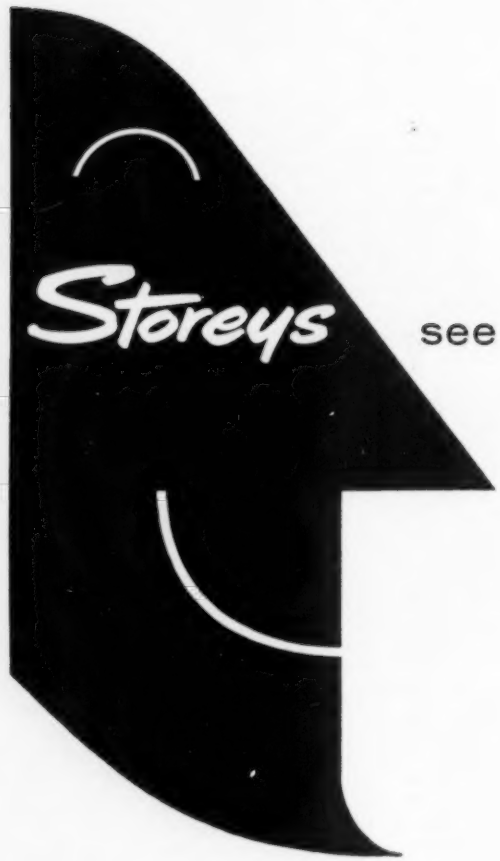
Static Elimination

Anti-static equipment is sometimes necessary and a complete service is demonstrated by MEECH ELECTRIC DRIVES (LONDON) LTD. (Stand C110). The Simco Aerostat is a long-range static eliminator capable of neutralizing materials up to 4ft. away. Ionization is produced in the neutralizer-head and is carried in the air stream from the blower to the material to be discharged. The technique might well find extensive use in industry, where dust attraction is a particular problem. The processing of ptfe powders is an important case in point. Large plastics parts, even those with deep indentations can now be effectively neutralized since the air from an Aerostat will travel beyond the range of an ordinary static part.

PRODUCTS and MATERIALS

THE use of plastics sheets and foil in the packaging field has increased enormously within the last few years. The seventh International Packaging Exhibition which is to be held at Olympia in September will cover more than 300,000 sq. ft. of floor space — more than double the area used for the previous exhibition in 1955. Many of the exhibitors at the exhibition in September are also exhibiting at Interplas, and many more will be showing products made from materials shown at Interplas.

BRITISH CELANESE LTD. (Stand B215), leading producers of acetate plastics — one of the first plastics materials in the packaging field — are displaying a wide range of products and raw materials. These include Clarifoil acetate film widely used for packaging, laminations and type-



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FABRICATION FROM SHEET

writer ribbons. Polyplex polypropylene sheet is used for food and medical packaging where sterilization is necessary. Other applications for this material include the production of textile bleaching plant, and for industrial equipment, ducting and tanks which have to withstand corrosive liquids or gases. Claritex wire reinforced acetate film finds applications for horticultural and general purpose glazing and the exhibit will also include samples of articles fabricated from Celatron high impact polystyrene.

Of particular interest to chemical engineers and fabricators will be the Vitrathene polythene and unplasticised vinyl sheets in very large sizes on the stand of STANLEY SMITH AND CO. (Stand B227). These allow the easy and economical fabrication of large diameter pipes and ducts and other chemical plant. This company specializes in the production of large moulded sheets in thicknesses from 1/16 in. up to 1in. but is also showing Vitrone plasticized vinyl sheetings for packaging, opaque laminated film for inflatables and embossed sheeting for loose-leaf binders and fancy goods.

The sheetings and fabrics being displayed by STOREYS OF LANCASTER (Stand C68) should give a good idea of the wide range of effects which can be achieved and the numerous applications for these types of material, particular emphasis being placed on industrial applications and clothing. Auralan is a pile fabric consisting of a cotton fabric with a pile of viscose rayon fibres anchored to a rubber in-

Fig. 30. Designs in printed and embossed pvc films are included in the Adretta range of curtaining, wall covering and furnishing materials

termass. Main applications for this material are for hats, handbags, fashion accessories and garments, including rainwear. Stormur vinyl wall coverings are available in a range of 64 effects and are being increasingly widely used for decorating schools, clinics, offices, hotels, shops and public buildings and any type of interior where durability and low maintenance costs are of paramount importance. During the exhibition an extensive fashion parade will be held demonstrating the use of Storeys fabrics, including Neolan expanded pvc, in clothing. Another form of sheeting featured will be Plastolam, designed for laminating to metal and other surfaces such as hardboard, plywood and chipboard to impart good chemical and abrasion resistance.

A well-known name in the field of plastics sheeting in Western Germany is that of WEBER AND SCHULZ (Stand BB533). This firm specializes in pvc sheeting for furnishing and other domestic applications and their exhibits include Adretta designs for curtaining and wall coverings (Fig. 30).

THE DISTILLERS PLASTICS GROUP (Stand B216), like most of the big material manufacturers, is showing a wide variety of finished products made from their raw materials. Packaging applications are one of the features, particularly disposable packs mass produced from thin Styron polystyrene sheet. These are clean, attractive and very light and being odourless and non-toxic are widely used for packaging foodstuffs. Another recent development in the use of Geon high impact pvc in the form of extruded sheet is for the construction of boats. A boat built in Geon rigid pvc on the stand together with the recently issued booklet outlining the ways in which this development is important to boat builders and manufacturers of boat-building kits.

LIST OF EXHIBITORS — FABRICATION FROM SHEET

Materials

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

ANCHOR CHEMICAL CO. LTD., Clayton, Manchester 11.	**CC 421**	**ABS sheet.**
BAKELITE LTD. 12-18 Grosvenor Gardens, S.W.1.	**C 38**	**Warerite decorative laminates.** Vybak sheeting as a lining for chemical road tanker.
BX PLASTICS LTD. Higham Station Avenue, Chingford, E.4.	**B 224**	**Xylonite and bexoid.** The uses include such applications as spectacle frames and handkerchief boxes.
COMMERCIAL PLASTICS (SALES) LTD. 1 Avery Row, Grosvenor Street, W.1.	**C 64**	**Fablon pvc sheeting, Superlon pvc, Nappatex upholstery materials, Craythenin unplasticized pvc film and Fablonite melamine laminated sheeting.** Sheetings for a wide range of applications including clothing, toilet goods, inflatables, upholstery and furniture.
CORNELIUS CHEMICAL CO. LTD. Ibex House, Minories, E.C.3.	**BB 513**	**Plexiglass acrylic sheeting. Plexidur polyacrylonitrile sheeting.** Outstanding solvent and impact resistance.
DISTILLERS PLASTICS GROUP Devonshire House, Piccadilly, W.1.	**B 216**	**Fabricated articles from Styron and Geon pvc.** The unsinkable pvc boat will be on the stand, and Styron will be displayed in packaging uses.
DU PONT CO. (UK) LTD. 76 Jermyn Street, S.W.1.	**C 74**	**Butacite polyvinyl butyral sheeting.** Gradient tinted car windscreen.
B. J. HAMLIN LTD. Greener House, 66-68 Haymarket, S.W.1.	**BB 512**	**Astralon. Pvc copolymer. Celluloid sheet. Makrolon polycarbonate, Mipolam plasticized and rigid pvc.** Wide range of sheet materials with special grades for vacuum forming, curtaining, electrical applications and fancy goods.
IMPERIAL CHEMICAL INDUSTRIES LTD. Plastics Division, Millbank, S.W.1.	**C 66**	**Propathene fume ducting.** I.C.I. plastics in building — the theme of the exhibit — will demonstrate the use of a wide range of I.C.I. products.

FABRICATION FROM SHEET

M AND B PLASTICS LTD. Dagenham, Essex.	B 207	**Acelon and Rhodialine cellulose-acetate films and sheet, Rhovilene vinyl copolymer sheet, Rholene high-density polythene sheet and film, Mirralon metallized cellulose-acetate film, and Ciponyl polyamide films.**
THE NORTH BRITISH RUBBER CO. LTD. P.O. Box 47, Castle Mills, Edinburgh, 3.	CC 149	**US Royalite-Nitrile thermoplastic sheet.** Unique application in the television field.
PERMALI LTD. Bristol Road, Gloucester.	CC 414	**Permaflon processed ptfe sheet. Permali impregnated, laminated, densified wood sheet.**
SHELL CHEMICAL CO. LTD. Old Burlington Street, W.1.	B 218	**Carinex polystyrenes, and styrene acrylonitrile copolymers.** Carlona polypropylenes and polythenes.
STANLEY SMITH AND CO. LTD. Worple Road, Isleworth, Middx.	B 227	**Vitrone pvc sheeting and film, Vitrathene polythene sheeting.** Vitrone available in flexible and rigid grades; clear, opalescent and opaque and in tinted grades.
US INDUSTRIAL CHEMICALS CO. INTERNATIONAL P.O. Box 10, Kirchenstrasse 13, Zug 1, Switzerland.	B 209	**Petrothene R polythene resins for blown film, cast film and substrates.** Packaging with polythene film will be demonstrated on two MA machines and a new edition of the USI Polythene Processing Guide will be available.
UTILEX LTD. Mill Street, Kingston upon Thames, Surrey.	BB 505	**Cellulose-acetate films, clear transparent and coloured.** Also metallized grades.

Machinery

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

BIELOMATIK (LONDON) LTD. 7 Cotswold Street, S.E.27.	C 23	**Forming and butt welding equipment for fabrications from sheet and extruded sections.** New 4ft.-wide Forming and butt welding table on demonstration.
BONE BROTHERS LTD. Manor Farm Road, Alperton, Wembley, Middx.	C 91	**Polythene bag making machinery.**
DELBAG AIR FILTERS LTD. Arundel Road, Industrial Estate, Uxbridge, Middx.	B 234	**High-speed welding torches, Thermobande welding equipment.**
F. J. EDWARDS LTD. 359-361 Euston Road, N.W.1.	A 302	**Sandt Model ST 139 electro-hydraulic, swing-arm clicking press.** Model ST 122 electro-hydraulic, 4-column cutting press. Sealwel desk-type h.f. welding machine.
ENGLEMANN AND BUCKHAM LTD. William Curtis House, Alton, Hants.	C 41	**Erwin Kampf Quick lathe-type cutting machine. KS7 automatic high-speed slitting and rewinding machine. WS 300 dicer.** KS7 incorporates a new and revolutionary method of tension control. Operating speed, 1,700ft. min.
FELBER JUCKER AND CO. LTD. Brook House, 48 Upper Thames Street, E.C.4.	A 320	**Korting-Kiefel range of HF welding machines.** Ancillary equipment is also available and will be demonstrated.
HF INDUSTRIAL SERVICES LTD. 317-319 High Road, N.22.	A 332	**The Acme range of plastics welding equipment.** A new, fast-cycling automatic press in the 6-10kW. range, a new type of double-tray shuttle press, and a combined welder and clicker cutting press in the 1½kW. range.
INTERNATIONAL CORPORATION LTD. 1 Cornwall Road, S.E.1.	A 322	**Berstorff calenders.**
MARKMASTER (TRADING) LTD. 39 Victoria Street, S.W.1.	C 49	**Markmaster dry-colour marking, blocking and hot-stamping machines.** The Major, the largest standard machine of its kind in the world, and the unique, and completely automatic, electronically-operated tube-measuring and marking machine will be exhibited for the first time.
MEECH ELECTRIC DRIVES (LONDON) LTD. 150 Clapham Manor Street, S.W.4.	C 110	**A complete service for static elimination.** All types of anti-static equipment.
RADYNE LTD. Eastheath Avenue, Wokingham, Berks.	A 330	**Complete range of Radyne welders, generators, hand applicators and semi-portable presses, including the model W/6P.** The W/6P is a new type of pneumatically operated press with 24in. square platens.
REDIFON LTD. Broomhill Road, Wandsworth, S.W.18.	A 342	**Redifon radio-frequency plastics welders and heaters ranging from 800W. to 35kW.** Seven new models will be shown for the first time. Also on display will be Redifon leather-to-plastic bonders and pvc floor sealers.

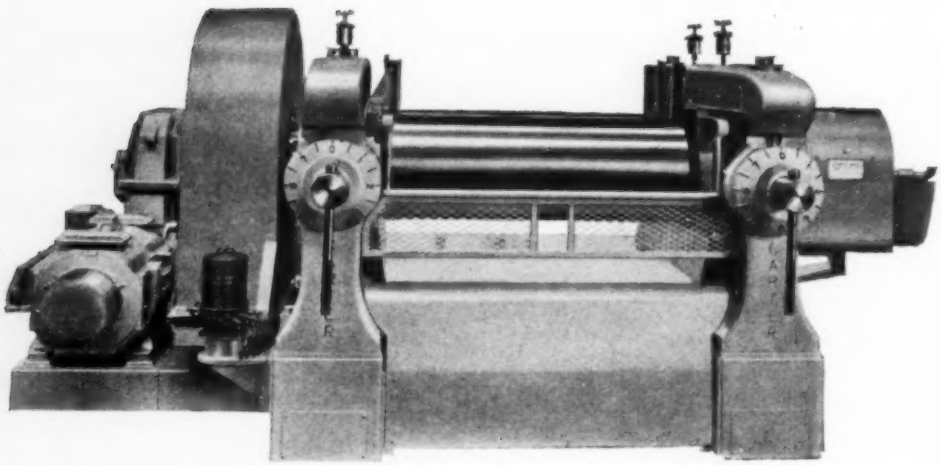
FABRICATION FROM SHEET

SYLPON MFG. CO. LTD. 73 Maygrove Road, N.W.6.	A 301	**Button-making machinery.** Gigant, seen for the first time in UK. A fully-automatic button-shaping press. Autotitania, automatic turning machine, with built-in photoelectric colour selector.

Products

(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)

B. ATTEWELL AND SONS LTD. Reflection Works, Thorney Lane North, Iver, Bucks.	BB 508	**Perspex aircraft tableware.** Designed for use in catering industries, airlines, hospitals and hotels, etc.
BARFLO LTD. 56 Cavendish Place, Eastbourne, Sussex.	CC 431	**All-plastic valves and expansion units.** The valves are corrosion-free and the units world patented.
CASCELLOID (DIVISION OF BRITISH XYLONITE CO. LTD.) Abbey Lane, Leicester.	C 65	**Cellulose-acetate packs for the confectionery, cosmetic, textile and fancy goods trades.** Pvc wallets, note-cases, menu covers, document cases. Suitcases in four colours, fully or partly lined, with pockets — washable, grained and glass-fibre reinforced.
P. B. COW (PLASTICS) LTD. Liverpool Road, Trading Estate, Slough, Bucks.	B 204	**Pvc film, drum liners, inflatable airbeds, etc.**
DELBAG AIR FILTERS LTD. Arundel Road, Industrial Estate, Uxbridge, Middx.	B 234	**Polythene mouldings up to 120lb. in weight.**
KINGCRAFT LTD. Mill Street, Kingston upon Thames, Surrey.	BB 505	**Cellulose-acetate clear containers and displays.** Also coloured and metallized.
CHARLES LENNIG AND CO. (GREAT BRITAIN) LTD. 26-28 Bedford Row, W.C.1.	BB 547	**Oroglas acrylic sheet.** Available in a wide range of colours.
LONDON ASSOCIATION FOR THE BLIND Pelican House, 88-92 Peckham Road, S.E.15.	BB 506	**High-frequency welded articles.**
METAL BOX CO. LTD. (THE) Plastics Group, 37 Baker Street, W.1.	B 206	**Polythene and acetate films and foils for packaging applications.** Diothene polythene film bags, Diosack heavy-duty polythene sacks, Densothene h.d. polythene, Metathene polythene-coated cellulose and Metalam acetate x foil.
OLYMPIC PLASTICS LTD. Fourth Way, Exhibition Grounds, Wembley, Middx.	BB 517	**Perspex signs, comprising engraved, embossed, silk-screen printed, and plastics letter signs.** Display cases, industrial guards, exhibition models and lampshades. Perspex case for Buromatic photographic copying machine, incorporating mouldings in nylon and acrylic.
PLYSU PRODUCTS LTD. Woburn Sands, near Bletchley, Bucks.	CC 412	**Industrial protective clothing and Corrugaiters from high-frequency welded pvc.** Special display of pressure ventilated clothing to UKAEA specification.
SKANSKA ATTIKFABRIKEN Perstorp, Sweden. Associated with Perstorp Products (Gt. Britain) Ltd. 157 High Street, Orpington, Kent.	B 225	**Technical laminates. Copper-clad laminates. Swedish Perstorp decorative laminates.** Several new grades of these materials will be shown and the exhibit will also include household articles and decorative mouldings.
STOREYS OF LANCASTER White Cross, Lancaster, Lancs.	C 68	**Range of pvc-coated fabrics and sheetings.**
SUNTEX SAFETY GLASS IND. LTD. Thorney Lane, Iver, Bucks.	BB 528	**Fabricated products in a variety of materials.** Aircraft canopies and panels, fluorescent lighting reflectors and diffusers, medical arm and leg baths, bus and coach lighting fittings and roof panels, scooter screens, cast and extruded acrylic tubes, plastics illuminated signs.
WANDEX PLASTICS LTD. 23 Pitfield Street, N.1.	C 11	**Spectacles frames, extruded cellulose-acetate sheeting and buttons.** Main business of the company is to supply all thermo-plastic scrap to reprocessors. It has for many years exported plastic waste all over the world.
WEBER AND SCHULZ Hamburg-Bahrenfeld, Western Germany.	BB 533	**Adretta range of pvc-coated fabrics and sheeting.** Materials with textile and cellulose backings for curtaining, table cloths and wall coverings.



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Ancillary Services

AS with any industry or exhibition related to an industry — particularly one so diverse as plastics — there are many companies who provide ancillary services and products, which receive none of the consideration afforded the more obvious features of the industrial scheme — but without which the major industries could not exist.

No Exception

In this respect Interplas is, of course, no exception and several stands at the exhibition are devoted entirely to services which either apply

Fig. 31. The Engis precision flat lapping machine

in general to all of the sections already discussed or which cannot be readily classified into any of them. As well as these — there are exhibits on many other stands which are also unclassified since they do not refer directly to any fabricating method.

On the DISTILLERS PLASTICS GROUP stand (B216), one of the many themes will be the versatility of Hycar nitrile rubbers and latices, applications of which range from fuel hose to baby nappies.

The exceptional oil resistance of Hycar is demonstrated through its use in flexible containers. These containers can carry up to 1,500 gallons, resist oil, solvents and other chemicals and can be rolled up to save space when empty. Other uses which can be seen on the stands include a bellows — one of the largest ever moulded — industrial adhesives, shoes, special purpose papers and non-woven fabrics. The last mentioned is prominently featured and a new polyacrylate latex Hycar 2671 will be publicly shown for the first time. The material has outstanding resistance to UV light and gives an excellent bond when used with most textile fibres.

Vyon, porous material made from high density polythene by POROUS PLASTICS LTD. (Stand BB510), is being used with success in a variety of fields, expecially in air and liquid filtration, fluidizing powders with air, as a silencer on pneumatic equipment, and for moulding into orthopaedic splints and appliances. Other uses of Vyon are as a dessicant container between double-glazed window panes and as ink pads. The material is light, flexible, very strong, easily machined and available in sheets up to 32in square, while larger sheets can be formed by welding.

Radiation Tool

The use of radiation as a research and processing tool is demonstrated by HIGH VOLTAGE ENGINEERING CORPORATION (Stand C47) supplier of particle accelerators. A new low-energy electron accelerator, model ICT, is shown as a tool for process line polymerisation and sterilization of plastics materials. Sterilization of such items as hypodermic syringes and polythene tubing for medical use can conveniently be carried out by radiation where gas is impractical and autoclaving temperatures would damage the materials.

THE TINTOMETER LIMITED (Stand C101A) are manufacturers of a range of colour measuring instruments which are of value in ensuring constancy of the colour of products, matching colours, checking fastness of colour to light and chemicals, and controlling the quality of raw materials. These include the Lovibond Tintometer, a simple and inexpensive instrument useful for all these purposes, and several more elaborate and expensive tintometers.

A new machine which will be displayed by ENGIS LTD. (Stand C52) is a precision flat lapping machine costing only £85, as compared with existing machines costing several hundred pounds each (see Figure 31). The new machine is compact, and driven by a ½hp motor running at 1,420rpm. Drive is transmitted to a vertical spindle revolving

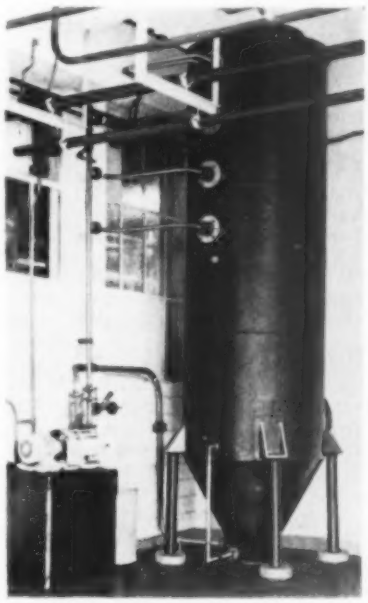

Fig. 32. This dust scrubbing tower has been exported to Germany by Tough Plastics Ltd. It has been installed by Elektrochemische Werke Munchen AG at the company's Munich works, and is built mainly from unplasticized pvc and polyester glass-reinforced plastics

at 75rpm. Five interchangeable close-grained cast iron lapping plates of the lift-off type, which have been hand scraped and lapped with different grades of Hyprez diamond compound can be supplied with each machine. Other exhibits on the stand are lapping compounds and abrasives for mould finishing and deflashing of mouldings.

LIST OF EXHIBITORS — ANCILLARY SERVICES

Ancillary Services *(The first column gives the exhibitor, the second the stand number, the third the principal exhibits only)*

ASSOCIATED ELECTRICAL INDUSTRIES LTD. Crown House, Aldwych, W.C.2.	C 53	**Infra-red oven. Infra-red conveyor unit.** Illustrating use of infra-red heating for processing plastics components.

ANCILLARY SERVICES

B. AND F. CARTER AND CO. LTD. Albion Works, Waterloo Street, Bolton, Lancs.	A 319	**Horizontal 24-carrier yarn braiding machine.** Will be shown braiding nylon tube with Terylene multi-yarn reinforcement.
BRITISH ERMETO CORPORATION LTD. Beacon Works, Hargrave Road, Maidenhead, Berks.	A 337	**Ermeto high-pressure valves, couplings, and flexible hose.** Mild-steel, stainless and brass couplings; mild-steel, stainless and aluminium-bronze valves, high-pressure flexible hose, and solid-drawn steel tubes.
DIMON (ENGLAND) LTD. 181a Bath Road, Slough, Bucks.	A 306	**Granulating, chipping and mixing equipment.** Battaggion dry-blend mixer for pvc has a capacity of 300 litres.
ENGIS LTD. Gabriel's Hill, Maidstone, Kent.	C 52	**Hyprez diamond compounds. Abradisc, Abracap and Engis sanderheads.** Lapping compounds and abrasives for mould finishing and deflashing of mouldings.
GENERAL ELECTRIC CO. LTD. Magnet House, Kingsway, W.C.2.	A 318	**Infra-red sheathed wire element panel with patented shutter device and separate temperature control.** Osram internal reflector lamp units and sheathed wire element reflector troughs.
HIGH VOLTAGE ENGINEERING CORPORATION Burlington, Massachusetts, USA.	C 47	**Low-energy electron accelerator model ICT.** Theme of exhibit will be radiation as a research and processing tool.
INSTRON LTD. Halifax Road, High Wycombe, Bucks.	A 317	**Precision tensile-testing equipment, rheometers, etc.**
INTERNATIONAL CORPORATION LTD. 1 Cornwall Road, S.E.1.	A 322	**Frieseke and Hoepfner Type FH.46 beta-ray gauges.** Other equipment on show will include edge grinders, winders and calenders.
INTERWOOD LTD. 326 Old Street, E.C.1.	A 335	**Range of trimming, cutting and sawing machinery.** This includes OFN/OFC electric high-speed router for deflashing mouldings and surface sanding and machining equipment.
JOHN KIMBELL AND CO. LTD. 4 South Lambeth Road, S.W.8.	A 333	**Werner and Pfleiderer ZSK machine, plastificator, granule cutter, cooler, dryer and premixer.** Complete equipment for granule production from the raw polymer is shown, suitable for use with most thermoplastics.
MEECH ELECTRIC DRIVES (LONDON) LTD. 150 Clapham Manor Street, S.W.4.	C 110	**A complete service for static elimination and Croxtine anti-static spray.** All types of anti-static equipment, aerosol packed.
PRITEX (PLASTICS) LTD. Wellington, Somerset.	C 75	**Pricella bonded cellulose-acetate wadding.** Also available plasticized and coated for welding to non-thermoplastic materials.
REEVES AND SONS LTD. Lincoln Road, Enfield, Middx.	C 6	**Translucent sheeting incorporating Reeves dispersed pigments.** Pigments for colouring pvc and polyester resins dispersed in various media such as DOP, DAB and DBP.
SIMPLIFIX COUPLINGS LTD. Beacon Works, Hargrave Road, Maidenhead, Berks.	A 337	**A range of brass compression fittings for outside-diameter copper tube from ⅛in. to 2⅛in.** Steel fittings for the same size range will also be shown. Also displayed will be the special range of fittings for use on nylon tube.
SCIENTIFIC PHARMACALS LTD. 1 Eden Street, N.W.1.	CC 428	**Kerocleanse Nos. 22, 25 and 26, Kerodex.** Special hand cleansers and barrier creams for synthetic resins and adhesives.
J. STONE AND CO. (DEPTFORD) LTD. 2 Lambeth Palace Road, S.E.1.	A 322	**Stone-vapour boilers, and Hi-R-temp liquid-phase heater.** The boilers are oil-fired and automatic, and the heater exploits all advantages of the heat-transfer oil systems.
THE TINTOMETER LTD. Waterloo Road, Salisbury, Wilts.	C 101a	**Range of instruments for colour measurements and analysis.** Including Lovibond tintometer, Lovibond Schofield tintometer and Lovibond comparator.
WEST INSTRUMENT LTD. 52 Regent Street, Brighton, Sussex.	C 101	**A new melt thermocouple and pressure transducer with the Gardsman range of stepless, proportioning and on/off indicating and controlling instruments.** Also shown will be a range of programming, scanning, and other pyrometric equipment and thermocouples suitable for the plastics industry.
WINKWORTH MACHINERY LTD. 65 High Street, Staines, Middx.	C 90	**Machines from a range of 'Z' bladed mixing machines. Model U22S dry blender. Model C.T.40 twin-drum tumbler.** Model 29Z twin 'Z' bladed mixing machine is a heavy-duty model. For the mixing of the most viscous of materials.

EUROPEAN TECHNOLOGY REVIEW

Continued from page 926

the rubber. The results also led the authors to state that comparative tests of different compounds should be made at constant stress or at constant strain, whilst comparisons of different polymers should preferably be made at the critical deformation for each of the polymers. They further stated that in their opinion the best index of ozone resistance was the concentration of ozone required to produce rupture in a given time, although the order of ozone resistance of various polymers changes with time.

Ozone and Other Chemicals

The similarity of the attack on rubber by ozone and by other materials has been demonstrated by workers[3] at the Rubber Research Institute in Moscow, including the two already mentioned. The authors used a carboxylated butadiene-styrene rubber, vulcanized with magnesium oxide, which was susceptible to attack by ozone and also by acids, the latter attacking the magnesium cross-links.

Ozone attack on the polymer was measured by the time to rupture under constant deformation, whilst the attack of acetic and hydrochloric acids was measured by the increase of Mg^{++} ions in the solution.

It was found that the rate of attack of an undeformed vulcanizate was dependent on the physical process of diffusion, while the rate of attack of a deformed vulcanizate was dependent on the reaction between the chemical species involved. The apparent activation energy of the process of rupture did not undergo change when the deformation was increased from 30% to 80%, but increased at higher deformations: it was found to be lower in the gaseous phase than in an aqueous solution of the same medium. The temperature coefficient of rupture depended on the chemical nature of the bonds being destroyed and upon the capacity of the reactive medium to be adsorbed by the compound. As in the previous paper, there was shown to be in all cases a critical deformation where the time to rupture passed through a minimum. This critical deformation varied with the temperature, the type of reaction medium and its physical state. This could cause anomalies at certain concentrations such as the case in which the time to rupture at a low temperature was less than that for a high temperature, even though the deformation and concentration remained the same.

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[1] I. F. Kanavets and L. G. Batalova, *Plast. Massy*, 1960, No. 2, 64-72; RAPRA Translation No. 877.

[2] Y. S. Zuev and S. I. Pravednikova, *Trudy N.I.I.R.*, 1960, Sb 6, 3; RAPRA Translation No. 904.

[3] Y. S. Zuev, A. Z. Borschchevskaya, S. I. Pravednikova and U. Yue-chin, *Vys. Soed.*, 1961, **3**, No. 2, 164-173; RAPRA Translation No. 907.

PVC car mats are being produced by the Marley Group. The pile is composed of $\frac{3}{16}$ in. of closely gathered vinyl spines

Plastics Materials Sales

NET sales of plastics materials of UK manufacture in the first quarter of 1961 at 143,400 tons were slightly higher than in the previous quarter, as indicated in last week's *RPW*. Manufacturers' stocks at the end of the first quarter at 104,400 tons were little higher than at the start (whereas throughout 1960 stocks had been rising steeply). Thus production during the quarter is estimated to have been about 5% below that of both the previous quarter and the first quarter of last year. This position is shown by official Board of Trade figures.

Direct exports of plastics materials in the first quarter at nearly 47,800 tons were well over 7,000 tons more than in the last quarter of 1960 and about 5,400 tons (nearly 13%) more than a year earlier. Imports were 19,500 tons, a fall of about 3,500 tons as compared with the previous quarter, and of nearly 3,000 tons (13%) as compared with the first quarter of 1960.

Both total UK consumption of plastics materials (estimated by subtracting exports from UK manufacturers' total sales, and adding imports), and home consumption of UK produced plastics materials, appear to have been considerably lower in the first quarter of 1961 than in the previous quarter, and corresponding quarter of 1960.

Net sales of thermoplastics in the first quarter, at 93,600 tons, were little higher than a year ago. Although net sales of both pvc and polyolefines overall were slightly lower than a year earlier, sales of the more highly processed materials (sheet, rod, tube, etc.) increased; sales of polyolefines in the form of sheet, etc., at 27% above a year earlier continued to show rapid growth, though at a rather lower rate than in 1960.

Sales of acrylics and polystyrene were considerably higher than a year earlier. Sales of thermosetting materials at 49,800 tons were 9% lower than in the first quarter of 1960. The fall of alkyds, as compared with a year earlier, was very marked; sales were 16% lower. Polyesters (sales of which were 14% higher) were the only thermosetting materials which did better than in the corresponding quarter of 1960.

The figures have been compiled from returns from nearly 170 firms known to have been manufacturing plastics materials, whether for sale or for use in the production of plastic goods or incorporation in other goods containing plastics materials.

NET SALES OF PLASTICS MATERIALS, FIRST QUARTER 1961
(in thousand tons)

	Jan.-Mar., 1960	Jan.-Mar., 1961
Thermosetting materials:		
Alkyds	12.8	10.7
Aminoplastics	15.5	14.2
Phenolics and cresylics	20.8	19.2
Unsaturated polyesters(*a*)	2.1	2.4
Others(*b*)	3.7	3.4
Total thermosetting	54.8	49.8
Thermoplastic materials:		
Cellulose plastics	3.5	3.4
Polyvinyl chloride(*c*)	26.3	27.4
Polystyrene	11.0	12.3
Polyvinyl acetate	3.9	3.9
Polyolefines (polythylene and polypropylene)	29.0	28.0
Other(*d*)	18.8	18.5
Total thermoplastic	92.6	93.6
Total, all plastic materials	147.4	143.4
Stocks at end of period:		
Thermosetting materials	19.0	20.7
Thermoplastic materials	47.6	83.6

(*a*) Excluding epoxide resins and resins for the manufacture of polyurethanes.
(*b*) Including epoxide resins and casein plastics.
(*c*) Excluding sales of resins (*i.e.* polymers sold as such).
(*d*) Including acrylics, polyamides, polytetrafluorethylene, polyvinyl chloride resins (*i.e.* polymers sold as such).

Any apparent discrepancies are due to rounding of figures.

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Plantation Newsletter

COLOURED DOTS MARK THE PROGRESS

by our Malayan Correspondent

FROM KUALA LUMPUR

MANAGERS of rubber estates are continually looking out for new ideas aimed at increasing incentive of their workers to produce better results. One manager of a 2,000 acre estate in Pahang, Central Malaya, has hit upon an unorthodox way of stimulating competition among his 600 field staff.

Every morning before the crack of dawn, he is up painting white, green, black and red polka dots on the trees — and each colour has a very definite message for the rubber tappers.

As on all estates, each tapper is allocated a certain number of trees and the management keeps a record of production of latex from these trees. It is based on these production figures that the manager knows what colour dots to paint on the trees.

A white dot means that the tapper concerned is doing well and is due to receive an incentive bonus of 10% of his gross earnings. A green dot nets a 6% increase for the tapper; a black dot, nil; and a red means that his work is below par and that a month's notice is probably on the way.

Last month, 22 tappers on this estate got 'red' and were transferred to the weeding section of the plantation — a demotion.

This illustration brings into focus the efforts now being made by employers to offer incentives as a means of getting the most from their employees. Many estate managers are now learning and using psychology in dealing with their staffs.

Planters Meet Scientists

Plans are now almost finalized for the planters' conference, organized by the Rubber Research Institute, which is due to be held in July.

It will give planters their first opportunity for 21 years to face across a table a group of scientists and to expound their views on the rights and wrongs of rubber planting as advised by the RRI. The conference has all the makings of a stimulating exchange of ideas providing the planters themselves come forward with suggestions and, if necessary, criticism of the recommendations made by the Institute.

There is no doubt that the men of the RRI can gain a great deal from the rubber planters, who are on the ground and are naturally fully acquainted with day-to-day estate conditions.

In 1938, the first planters' conference was called in Kuala Lumpur. It was intended to be the first of a series, but others have not materialized.

It has taken a long time for the second planters' conference to be called and probably the outcome of July's meeting will no doubt determine whether or not they should continue.

There are high hopes that more such conferences will take place; in fact, there is no reason why they should not become an annual institution.

The RRI has already made it clear that it does not want the conference to become an occasion for mere exchange of courtesies. It seeks frank and open expression of views and experiences with 'no holds barred'.

The topic chosen for this year's conference is tapping and yield stimulating, two subjects which every planter must be very familiar with in order to hold down his job.

Today the 'ball' is in the hands of the planters and it is up to them to make the most of this opportunity for an exchange of ideas.

Not Colour Conscious

Firms dealing in motor tyres in Malaya doubt if tyres of different colours would prove to be popular here. It was announced earlier that the Goodyear Tyre and Rubber Co. of America have developed multicoloured tyres.

One leading agency here said that if these tyres, designed to tone with the colour of a car, proved popular in other countries, then no doubt Malaya would start importing them. But how popular they would prove to be depended on their selling price.

Rubber Statistics

WEST GERMANY — BRAZIL

WEST Germany's rubber tyre production dropped sharply during April to 18,720 tons from 21,528 tons made during March, according to figures released by the Federal Bureau of Statistics.

Production in the first four months of this year, however, was still well above the extraordinarily high production of last year, 78,030 tons, compared with 75,601 tons produced in the January to April period of last year.

In the individual sections of the West German rubber tyre industry production for April was (in 1,000 units): car tyres: 1,068; lorry tyres: 142; bicycle tyres: 978; motor cycle tyres: 67.

Output of other hard and soft rubber goods during April dropped appreciably to 22,914 tons from 25,474 tons in March and 22,944 tons in April of last year. In the first four months of this year it totalled 100,566 tons against 94,155 tons in the first four months of last year.

Imports of natural rubber and rubber sole crepe during March totalled 8,526 tons, including 4,658 tons from Malaya, 956 tons from Thailand and 540 tons from Nigeria. In the first three months of this year, imports totalled 27,224 tons, including 15,608 tons from Malaya, 2,818 tons from Thailand and 2,078 tons from Nigeria.

Imports of synthetic rubber during March totalled 4,033 tons, including 2,242 tons from the USA, 816 tons from Canada and 329 tons from the Netherlands. In the first three months of this year imports totalled 12,331 tons, including 7,571 tons from the USA, 2,558 tons from Canada, and 831 tons from the Netherlands.

Brazil

The Vice-President of the Comissao Executiva de Defesa da Borracha has estimated that Brazil will produce 29,000 tons of rubber in 1961, of which 21,000 tons will be uncultivated, 2,000 tons plantation, 2,000 tons latex, and 4,000 tons will be obtained from the Duque de Caxias synthetic plant near Rio de Janeiro.

Since consumption in 1961 will be about 69,000 tons, some 40,000 tons will have to be imported.

In the next five years imports will decline as the Duque de Caxias plant reaches full production capacity. The projected plant in Pernambuco, Coperbo, is expected to contribute 27,000 tons a year.

These rolling liquid transporters being tested by Firestone Tire and Rubber Co. in America can carry enough petrol to last an average motorist six or seven years; in effect they are tyre and vehicle rolled into one. They have been designed for the US Army to serve as a portable petrol station for combat units. The containers — capacity 500 gallons — will seal themselves when penetrated by small arms projectiles as the synthetic rubber in the body and tread quickly expands and seals the bullet holes

Rubber Markets

LONDON

Rubber prices finished the week ended June 13 fractionally lower on balance. The market ruled comparatively steady for the early part of the period, making the occasional minor movement either way in line with overseas advices. However, values receded by about ¼d. towards the end of the week, following easiness at Singapore which was reportedly influenced by fresh rumours of a modification of the US stockpile sales programme. Turnover in the landed market was comparatively small and was said to be mainly of a covering nature. A small amount of short-covering was noted in physical rubber for higher grade sheets, but off-grades were somewhat neglected.

Latest prices are as follows:
No. 1 RSS Spot: 24⅞d.-25d.

Settlement House:
July 24⅞d.-25d.
August 25d.-25⅛d.
September 25d.-25⅛d.
July/September 25d.-25⅛d.
October/December 25d.-25⅛d.
January/March (62) 25⅛d.-25¼d.
April/June 25⅛d.-25⅜d.

No. 1 RSS cif basis ports:
June 24⅞d.-24⅞d.
July 24⅞d.-25d.

Godown:
June 83¼ Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, August, 14s. 4d. cif European ports. Spot, seller, 14s. 10d. Bulk, seller, d.w. 14s. 3d. Normal, seller, August, 11s. 8d.

NEW YORK

The New York rubber market ruled as under on June 12:

DEALERS' PRICES

	US cents per lb., ex-dock	
	June 12	Previous
No. 1 RSS, June ..	29⅞n	30 b–30⅛a
July ..	29½t	29½b–30⅛a
No. 2 RSS, June ..	29½n	29½b–30 a
July ..	29⅜n	29⅛b–29⅞a
No. 3 RSS, June ..	29½n	29⅛b–29⅞a
July ..	29⅛n	29⅛b–29⅞a
No. 1 RSS, Spot ..	30⅛n	30⅛a
No. 3 amber blanket crepe, June ..	25⅛n	25⅛n

FUTURES—REX CONTRACT

	Close	Prev. Close
July ..	29.95b–30.50a	30.40b–30.90a
Sept. ..	29.17t	29.60b–29.80a
Nov. ..	29.10t	29.50b–29.65a
Jan. ..	29.05t	29.40b–29.50a

Sales: 30. Tendency: Steady at decline.

Futures were easier on June 12, declining by about ½ cent per lb. on liquidation in modest dealings. The decline abroad influenced selling here. Physical rubber was quiet and softer. In late dealings, futures held at the earlier decline.

SINGAPORE

Further strong rumours about modifications of the US stock-pile sales programme depressed prices at the beginning of June 12. This was followed by selling in advance of the May import figure which was expected to be fairly considerable. Later, the announcement of this May figure at 42,695 tons (actual arrivals 38.539 tons) —which although high was less than market expectations—caused a halt to the decline after which quiet conditions ruled. Lower sheet interest was small and largely confined to some covering for near shipment. The market closed the morning session on a quiet note. In the afternoon, the market was quietly steady on better lower-grade enquiry. Transactions were brisk.

	Malayan cents per lb., fob Malayan ports to open ports	
	June 12	Prev. Close
No. 1 RSS, June ..	83⅝–84	84⅛–84½
July ..	83⅜–84	84⅜–84⅝
No. 2 RSS, June ..	83½–83⅞	83⅞–84⅛
No. 3 RSS, June ..	83 –83⅜	83½–84
No. 4 RSS, June ..	80¼–80¾	80½–81
No. 5 RSS, June ..	71 –72	71¼–72¼
No. 1 RSS, Spot ..	83¼–84¼	84⅛–84⅜
No. 3 blanket thick re-milled, June ..	70 –71	70½–71½
No. 1 fine pale crepe, June	90½–91½	91½–92½
2X thin brown crepe, June	66½–67½	67½–68½

Tendency: Slightly steadier.

The Industries Syndicate quote latex, native produce, 60% centifugal, packed in rectangular drums, fob at 166.60d. per gal.

AMSTERDAM

The Amsterdam rubber market ruled as under on June 12:

	Guilders per kilo	
No. 1 RMA	June 12	Previous
June	2.33	2.32
July	2.34	2.33
August	2.34	2.33
September	2.34	2.33
July/September ..	2.34	2.33
October	2.35	2.34

Sales: Nil. Tone: Quiet.

DJAKARTA

No transactions took place on June 12. Sellers were still above buyers' ideas. Offerings were scarce. The market closed very quiet. No. 1 buyers was 50 cents below the previous day's trading level at 31 rupiahs per kilo.

	Rupiahs per kilo	
	June 12	Previous
Spot No. 1 Priok ..	31.00b	31.50b
Spot No. 2 Priok ..	30.00b	30.50b
Spot No. 3 Priok ..	29.00b	29.50b
No. 1 fine pale crepe, spot	28.00b	28.50b

Tendency: Very quiet.

BANGKOK

The price of No. 1 RSS at Bangkok on June 12 was 27.00 (27.12½) US cents per lb.

CEYLON

The price of No. 1 RSS at Colombo on June 12 was 100¾ (101¼) Ceylon cents per lb.

CORRESPONDENCE

Testing by the Small Compounder

Sir,

With reference to Cepar Testing in rubbers and plastics ('Views and Reviews', May 6), we are quite new to rubber compounding and have recently put in a 16in. x 40in. ram extruder to manufacture our own camel back.

The Cepar Tester appears to be a useful apparatus for a small compounder, and we should like you to give us an address so we can write for more information.

As far as we can gather, the smaller compounders, such as ourselves, have no testing of their products at all; the large companies have elaborate labortories. It would appear that there should be a 'half way house', *i.e.* fairly simple equipment that can keep the small compounder out of trouble. Perhaps the Cepar Tester is what we are looking for?

Yours truly,

Vacu-Lug (Pvt.) Ltd., Salisbury, Southern Rhodesia.

W. R. CHOWN,
Director.

Numbers of enquiries of this kind are dealt with by Charles Jennings, our 'Views and Reviews' contributor, and he is always glad to provide further details, as far as he is able, of any items he reviews.

IRI GOLF

Scottish Qualifiers

The challenge cup and Wallwork qualifying round was played at Kilmacolm recently. Except for the stiffish breeze, inseparable from an upland course, conditions were excellent. The fast and tricky greens took their toll, however.

Prize winners and leading scores were: D. Chesney 77—6: 71; J. M. Gallie 90—17: 73; W. Johnstone 90—17: 73; S. Jonker 95—22: 73; W. Sommerville 81—7: 74; A. Bell 79—4: 75; W. Boyd 91—15: 76; L. A. Johnson 91—14: 77; D. Barber 94—16: 78; A. Pratt 97—19: 81; P. W. Bell 86—5: 81; C. Cook 101—20: 81; W. Alexander 88—6: 82; and S. McElroy 87—5: 82.

Prizes were donated by Graem Hardie, J. Picken, L. Johnson and R. Barber. At the general meeting A. Ryan was again appointed vice-president, and J. M. Gallie captain for 1962—1963, with W. Boyd as vice-captain. W. Alexander was elected secretary and the committee completed by Mr Pratt, Mr McElroy, Mr Johnson and Mr P. Bell.

Industry INTELLIGENCE

Machines, Materials and Equipment

Powder Blending Machine

TP Chemical Engineering Co. Ltd. has introduced the TP patent powder blending machine, which is designed for blending powders of any type or chemical, with the advantage of being able to reduce particle size and eliminate agglomerations.

Consisting of a blending vessel with detachable end covers, to which are fitted specially designed scoops, it is claimed to provide a good blend of powders and flakes in five minutes and, in some instances, in less than one minute.

The dry colouring of compounds (crystals) is also achieved in the blender in several minutes. The blending thus obtained is said to eliminate extruding and cutting into granules before injection moulding.

Further information is available from the company at 5 Thornhill Road, West Croydon, Surrey.

Mixing Cycle Controller

Lindars Automation Ltd. has recently designed a fully automatic mixing cycle controller, which is suitable for use in conjunction with a Banbury or similar mixer, the complete mixing cycle being programmed from a punched card.

The company claims that the mixing cycles can be changed in a matter of seconds, by selecting the appropriate pre-punched card and inserting it into the Lindars card reader. This flexibility of operation makes the system suitable for use with mixers engaged on small batch production, especially where large numbers of different compounds are involved.

Light Fastness Tester

The Xenotest, an instrument for testing materials for light fastness, and for their ability to stand rain and moisture, has undergone a major redesign. On earlier models, a Xenon lamp emitted rays which penetrated through two special glass filters, prior to falling on the test samples. These filters were cooled by water. Now, the makers, Quarzlampen Gesellschaft mbH, of Hanau, Germany have redesigned the instrument, so that the filters are cooled by air. This not only enables a third filter to be introduced, thereby giving an almost exact reproduction of daylight, but it also means that the samples can be kept at a lower temperature while undergoing test.

This new instrument, known as the Xenotest-WL (Model PL671), is now claimed to enable samples to be placed in it and be tested with controlled temperature and humidity, and with sunlight about ten times as strong as the English average. Rain can be sprayed intermittently, as desired, to a selected programme. Whereas previously, there were certain wavelengths in the Xenotest that were not an exact reproduction of daylight, these peaks are now said to have been 'ironed out'. Further information can be obtained from John Godrich, 23 School Road, Shirley, Solihull, Warwickshire.

Technical Data

Geigy Products

Geigy Co. Ltd., Plastics Chemicals Division, Rhodes, Middleton, Manchester, has issued data on Reomol DV35, which has been designed to act as a modifier of low temperature properties of plasticized pvc systems, where good flexibility combined with high resilience is required.

The company has also published information on Product CGI, a copper greening inhibitor for pvc, and on RL Acid, a low cost activator and lubricant for rubber compounds.

RL Acid is said to be only slightly inferior to stearic acid, and it is possible that, when optimum cure conditions are established, it will be nearer to stearic acid in performance.

Cellular Soling

Polysar Technical Report No. 11:4A has been issued by Polymer Corp. Ltd. of Sarnia, Canada. This issue deals with 'Sueded Hard Cellular Soling'.

Hard, microporous soling has, of course, been used in the footwear industry for some time, and more recently there has been a demand for a hard cellular soling in which larger pores are scattered throughout the vulcanizate. This soling, after being split and buffed, has the appearance of 'sueded leather'.

A compound suitable for hard, cellular soling, based on Polysar SS-250 and Polysar Krylene 602 with silica and silicate fillers, is described in the report, which can be obtained from Polymer (UK) Ltd., Walbrook House, Walbrook, E.C.4.

Dekor Pvc Pastes

Scott Bader and Co. Ltd., Wollaston, Wellingborough, Northants., has issued new technical literature dealing with the Dekor pvc pastes and primers.

Dekor pvc pastes are compounds of a polymer, plasticizer, stabilizer and pigments. No solvents are present in the paste. The booklet gives the pastes' properties and their application by the hot dipping process, spreading, casting and low-pressure moulding.

Publications

Tenaxatex Adhesives

H. A. Smith Ltd., manufacturer of adhesives, resins and coatings, has published an illustrated booklet describing its Tenaxatex range of products. These include pva emulsions and prepared adhesives, acrylate polymers and co-polymers, methacrylate co-polymers and styrene co-polymers.

The booklet explains the work of the company's technical advisory service, by which special formulations are developed, and details the applications of Tenaxatex products in the manufacture, conversion and coating of paper and board, in packaging, textile finishing and carpet manufacture and building.

Silicones in Electronics

The widespread uses of silicones in electronic equipment are summarized by Midland Silicones Ltd. in its booklet 'Silicones in Electronics'. This describes the main types of silicone products of use to the electronic industry.

The publication is divided into three main sections: the first deals with encapsulating, impregnating, filling and coating materials; the second with fabricated insulating and structural components; and the third with production aids.

Copies of the booklet can be obtained from Midland Silicones Ltd., 68 Knightsbridge, London, S.W.1.

Filon Sheeting

BIP Reinforced Products Ltd., Streetly Works, Sutton Coldfield, has issued a booklet containing information on some of the uses of Filon, the new polyester glass fibre structural sheeting.

It is claimed to be an ideal shopfitting material for outside and inside work, because of its strength, light weight and ability to be fixed simply and quickly. Filon sheeting is available in corrugated, flat sheet and decorative profiles.

The publication and samples will be sent on request.

Tenite Colour Concentrates

Copies of Technical Report No. 4 issued by Eastman Chemical Products Inc., Kingsport, Tennessee, are now available on request. The publication compares the merits of Tenite colour concentrates with dry, powdery pigments and cites the greater degree of uniformity in colourant distribution and the time-saving operational steps that can be realized through use of polypropylene pellets in which colouring agents are predispersed.

As well as several suggestions and information on the application and use of colour concentrates, the report describes and illustrates three types of dispersion aids for improving colour-mixing action in injection-moulding machines.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

(810,825). Gutta-percha, rubber, balata, artificial gutta-percha, artificial rubber and artificial balata, and articles included in Class 17 made from these substances; material for packing (jointing), stopping and insulating; asbestos, mica and products thereof included in Class 17; and non-metallic hosepipes. Littlewoods Mail Order Stores Ltd., Waterloo Buildings, Cases Street, Liverpool, 1. To be associated with No. 685,114 (3772, 689) and others. (Class 17; March 15 1961.)

(810,853). Gutta-percha, rubber, balata, artificial gutta-percha, artificial rubber and artificial balata, and articles included in Class 17 made from these substances; materials for packing (jointing), stopping and insulating; asbestos, mica and products thereof included in Class 17; and non-metallic hosepipes. Littlewoods Mail Order Stores Ltd., Waterloo Buildings, Cases Street, Liverpool, 1. To be associated with No. 685,114 (3772, 689) and others. (Class 17; March 15 1961.)

Ueeflex (805,276). Plastics included in Class 1. Union Chimique Belge Société Anonyme, 61 Avenue Louise, Brussels, Belgium. (Class 1; April 12 1961.)

Porto-Sac (804,408). Portable containers for liquids, made of rubber or of oil-resistant synthetic rubber and included in Class 17. The Goodyear Tire and Rubber Co., 1144 East Market Street, Akron, State of Ohio, USA. (Class 17; April 12 1961.)

Bexfigla (812,432). Sisal rope coated in plastics; and rope ladders made from the aforesaid rope and having plywood treads coated with glass fibres. Reginald John Levy, 218 Albert Road, North Woolwich, London, E.16. (Class 24; April 12 1961.)

Japlast (803,579). Adhesives included in Class 1. Jablo Plastics Industries Ltd., Mill Lane, Waddon, Croydon, Surrey. (Class 1; April 19 1961.)

Hartex (796,083). Pale crepe rubber and natural rubber latex. The Firestone Tire and Rubber Co., 1200 Firestone Parkway, City of Akron, State of Ohio, USA. (Class 17; April 19 1961.)

Rymway (811,823). Non-metallic hose pipes; and plastics included in Class 17 in the form of sheets, blocks, rods and tubes, and being for use in manufacture. Yorkshire Imperial Metals Ltd., Haigh Park Road, Stourton, Leeds, Yorkshire. (Class 17; April 19 1961.)

Marvelplas (813,043). Plastics included in Class 17 in cellular form. Daniel Meyer, 58 Gt. Marlborough Street, London, W.1. (Class 17; April 19 1961.)

Matico (806,347). Floor and wall tiles of asphalt, vinyl, vinyl asbestos or of rubber. The Ruberoid Co., 117 Canal Road, South Bound Brook, State of New Jersey, USA. (Class 19; April 19 1961.)

Plastiriv (811,651). Sheets, panels and boards, all made of laminations of plastics and being for use in building. Riv Officine Di Villar Perosa Societa Per Azioni, 53 Via Mazzini, Turin, Italy. (Class 19; April 19 1961.)

Plastirivmel (811,652). Sheets, panels and boards, all made of laminations of plastics and being for use in building. Riv Officine Di Villar Perosa Societa Per Azioni, 53 Via Mazzini, Turin, Italy. (Class 19; April 19 1961.)

Polytint (807,205). All goods included in Class 2. Polycell Products Ltd., 73 Highgate Road, London, N.W.5. (Class 2; April 26 1961.)

CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

APPOINTMENTS VACANT

6d. a word. Minimum 12/6 Box 2/-

APPLICATIONS are invited for the position—foreman, extrusion department of a rubber company in Surrey. Pension and bonus schemes in operation.—Write in confidence, giving full details of age, experience and present salary to Box 1088. (1088)

ASSISTANT chemist required by medium sized company manufacturing sponge and mechanicals. He will be required to supervise the compounding section of the laboratory under the direction of the Chief Chemist. This is a first-class opportunity for a man under 35 who has had several years' experience in works or laboratory to become a member of an expanding and very progressive organisation.—Write giving full details of experience, qualifications, positions held and salary required to Box 1102. (1102)

DEVELOPMENT chemist required for rubber factory. Some knowledge of proofing desirable. Excellent opportunity, pension scheme.—Reply in confidence to Chief Chemist, Greengate and Irwell Rubber Co. Ltd., Greengate, Manchester, 3, stating age, experience and qualifications. (1110)

OPPORTUNITY occurs for keen intelligent person with knowledge of the rubber industry in office of Home Counties manufacturers and merchants. General duties in fostering expansion of sales and works progressing, etc. Excellent prospects for ambitious individual. Apply with full details of experience, age and salary required.—Box 1113. (1113)

APPOINTMENTS VACANT

(continued)

RUBBER and plastics technologists with experience required by Esso Research Ltd., to assist in technical service and development research work on elastomers. Candidates should possess Ordinary National Certificate, Diploma or Licentiateship of College of Rubber Technology or equivalent standard in plastics technology and have some practical experience. Salaries paid will be commensurate with qualifications and experience, and successful candidates will be appointed to the regular staff. —Applications in writing to Employee Relations Dept. (Ref. P.O.L.) Esso Research Ltd., Abingdon, Berkshire. (1106)

SMALL group of rubber manufacturers require the services of a technologist for liaison work with footwear manufacturers. Previous experience of soling materials and particularly compounds for direct vulcanising is essential. Car provided. Excellent pension scheme in operation. Very good prospects.—Apply with details of past experience, in confidence, to the Managing Director, Boro Rubber Manufacturing Co. Ltd., Para Rubber Works, Smithy Bridge, Littleborough, Lancs. (1114)

SENIOR latex chemist/technologist required by compounders in Manchester area. Experience of foam an advantage. Pension scheme in operation.—Write stating age, experience and salary required to Box 1103. (1103)

An exceptional opportunity

Rubber Company desires to appoint

WORKS DIRECTOR

Only men who are worth at least £2,500 per year should apply. An able and energetic man would have the opportunity of earning considerably more. Experience in manufacture of products for footwear industry, industrial mouldings and miscellaneous rubber goods or some of these is desirable. A seat on the Board and valuable prospects for the right applicant.

Apply in strict confidence to Chairman "Rubber Company" care of Forsyte Kerman & Phillips, 11 Mansfield Street, London, W.1. (1101)

APPOINTMENTS VACANT

Sutcliffe

SOUTHERN AREA SALES REPRESENTATIVE

(AGE 25-35)

FOR SUTCLIFFE MOULDED RUBBER CO. LTD.

This is a position which by the successful applicant's efforts, could eventually lead to promotion as Area Manager in charge of several representatives.

The man we are looking for will have had recent experience of mechanical rubber mouldings, extrusions, industrial roller coverings and the rubber trade in general.

Of at least Grammar School education, he must be able to read drawings, converse with knowledge of rubber applications and be clear and concise both verbally and in writing. He will be able to mix at all levels of management and should have one or more interests outside work.

The position carries a good basic salary with commission incentives, reasonable expense allowances, a car and contributory membership of insurance and pension schemes.

Please send full details of your education, experience and career to date to:

The Personnel Manager,
THE SUTCLIFFE MOULDED RUBBER COMPANY LIMITED
OSSETT · YORKSHIRE (1116)

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Applications to Director of Personnel, Castle Mills, P.O. Box 47, Edinburgh, 3.

(1117)

APPOINTMENTS VACANT

MSL *have been retained to advise on this appointment.*

GENERAL MANAGER

Rubber Manufacture

for a private company in the West London area employing about 1,000 on a variety of rubber products for the motor, household, and similar industries. He will be responsible to the Board for all aspects of production, including engineering, costing and planning. Starting salary would be up to £5,000 with non-contributory pension scheme and car.

Candidates 35 to 45 must be closely familiar with all aspects of rubber production and have had several years at least at works manager level in that trade. They should have an engineering training and a knowledge of modern time study and management accountancy. Please send brief details in confidence quoting reference number LU.3231 to H.C.S. Brand.

In no circumstances will a candidate's identity be disclosed to our client unless he gives permission after a confidential interview at which he will be given full details of the appointment.

MANAGEMENT SELECTION LIMITED
17 Stratton Street, London, W.1
(1111)

TECHNICAL salesman required by latex compounders in Manchester area. Car provided. Pension scheme in operation.—Write stating age, experience and salary required to Box 1104. (1104)

VACANCY for young rubber technologist with initiative and some experience in footwear. Salary according to experience. South London.—Box 1085. (1085)

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BRIDGE 60in. x 22in. mill with 100 h.p. drive. 30in. x 24in. and 21in. single geared cracker with 200 h.p. drive. 8½in. Royle extruder with 120/40 h.p. drive. Shaw 48in. x 18in. 3-bowl calender with 30/15 h.p. drive. Pair of 50in. x 18in. single geared mills by Robinson with 140 h.p. drive, through Moss double helical gearbox. 42in. x 16in. single geared mill by Power Plant with 50 h.p. drive.—Reed Brothers (Engineering) Ltd. (Receiver and Manager—Mr. C. E. M. Hardie), Woolwich Industrial Estate, London, S.E.18. Tel. Woolwich 7611. (1107)

CLECO Battery Electric Reach Type Forklift Truck. Manufactured 1957. 2,000-lbs. capacity. 6ft. lift. Travelling gallows type. Also fitted with hydraulic side shift and hydraulic fork width adjustment. Compact and highly manoeuvrable. This has been in operation less than 6 months from new and is in magnificent condition throughout. Complete with battery charging unit. £950. Photograph available.—Speed Electrics Dept. R.J., Church Street, Basford, Nottingham. Tel. 75716. (1100)

CONDUX cutting mill size CS-4. Suitable for heavy duty work, complete with 10 h.p. motor, 440 volts 3-phase, starter, stand, bagging device and motorised exhaust unit. Purchased January 1958.—Box 1112. (1112)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

(a) One—size CS5½D/TS3/IB/U double deri-sine pump, having independent discharges of 2.5 and 1.2 g.p.m. up to a pressure of 2,000 p.s.i. Pumps direct driven by a 5 h.p. Brook Squirrel Cage motor running at 1,450 r.p.m. Pump and motor mounted on a 25-gallon oil supply tank. This has been in use for less than 12 months.

(b) Two—Mono radial hydraulic control valves. Maker: Andrew Fraser and Co. Ltd., London. Type C1.41. Model VA.7139.

(c) One—2-way hydraulic valve. One inlet and one exhaust. Control units geared together for operation by single handle. Working pressure 3,000 lb. sq. in. ⅜in. diameter ports. Maker: George Ellison Ltd., Birmingham.—Caledonian Tooth Company Limited, Industrial Estate, Kingsway West, Dundee. (1109)

PLASTIC injection moulding machine, Windsor 6oz. model SH6. Steam boilers, 200lbs. to 16,000lbs. evaporation; Economic, Cochran, Lancashire; automatic oil and stoker firing; delivery and installation anywhere. Insurance approved and 12 months' guarantee. Highest part exchange valuations.—Fred Watkins (Engineering) Ltd., Coleford, Glos. Telephone: Coleford 2271 (5 lines). (1118)

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(continued)

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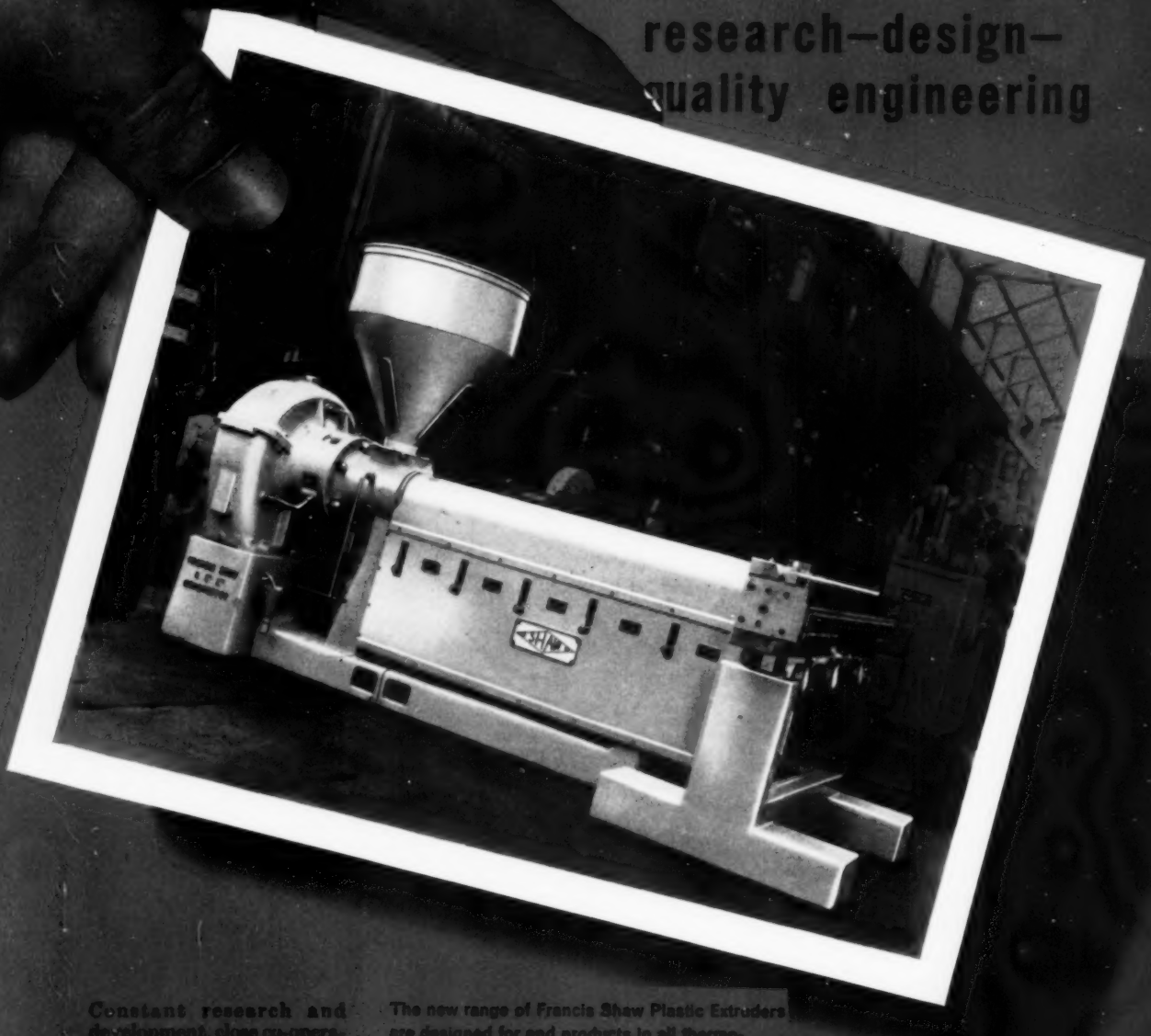

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